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Report on Active and Planned Spacecraft and Experiments

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August 1979



REPORT ON ACTIVE AND PLANNED
SPACECRAFT AND EXPERIMENTS

Edited by

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National Space Science Data Center

August 1979

National Space Science Data Center (NSSDC)/
World Data Center A for Rockets and Satellites (WDC-A-R&S)
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PREFACE

This *Report on Active and Planned Spacecraft and Experiments* provides the professional community with information on current as well as planned spacecraft activity in a broad range of scientific disciplines. Spacecraft that were active sometime in the time period July 1, 1978, to May 31, 1979, are included, as well as those planned missions that have progressed beyond the experiment or investigation selection stage. The document provides a brief description for each spacecraft and experiment as well as the current status. The performance information for active NASA and NASA-cooperative programs is based, to a large extent, on the project office status reports through May 31, 1979. The National Space Science Data Center (NSSDC) has attempted to update all performance information to that date.

We would like to acknowledge the cooperation of the staff at NSSDC in obtaining information and offering suggestions for this report. The cooperation of the project offices and experimenters in supplying current documentation of their spacecraft and experiments is gratefully acknowledged. We are particularly pleased with the many constructive comments and corrections we have received from interested users of this report.

Robert W. Vostreys
Richard Horowitz

August 1979

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INTRODUCTION

1. INTRODUCTION

1.1 Purpose

This *Report on Active and Planned Spacecraft and Experiments* provides the professional community with information on current and planned spacecraft activity for a broad range of scientific disciplines. By providing a brief description of each spacecraft and experiment as well as the current status, it is hoped that this document will be useful to many people interested in the scientific, applied, and operational uses of data collected. Furthermore, for those planning or coordinating future observational programs employing a number of different techniques such as rockets, balloons, aircraft, ships, and buoys, this document can provide some insight into the contributions that may be provided by orbiting instruments. One such program utilizing this report is the International Magnetospheric Study (IMS).

1.2 Contents

This document includes information concerning active and planned spacecraft and experiments known to the National Space Science Data Center (NSSDC). The information includes a wide range of disciplines: astronomy, earth sciences, meteorology, planetary sciences, aeronomy, particles and fields, solar physics, life sciences, and material sciences. These spacecraft projects represent the efforts and funding of individual countries as well as cooperative arrangements among different countries.

Descriptions of navigational and communications satellites are specifically not included in this report. Also not included are descriptions of spacecraft that contain only continuous radio beacons used for ionospheric studies. Many of these spacecraft are listed in the *SPACEWARN Bulletin**. No attempt has been made to include information regarding classified spacecraft or experiments.

1.3 Organization

This report includes two major sections with descriptive material introducing each section.

Section 2, "Descriptions of Active Spacecraft and Experiments," is a listing of descriptions of the spacecraft and experiments that were active sometime

*The *SPACEWARN Bulletin* is prepared by the World Data Center A for Rockets and Satellites, Code 601, Goddard Space Flight Center, Greenbelt, Maryland 20771, U.S.A. It is intended to serve as an international communications mechanism for the rapid distribution of information on satellites and space probes. It is published on behalf of the Committee on Space Research (COSPAR) by the International URSIGRAM and World Days Service (IUWDS), a permanent service of the International Scientific Radio Union in association with the International Astronomical Union and the International Union for Geodesy and Geophysics.

during the time period July 1, 1978, to May 31, 1979. The listing is arranged by spacecraft common name and the last name of the principal investigator or team leader.

Section 3, "Descriptions of Planned Spacecraft and Experiments," is a listing of descriptions of the spacecraft and experiments that were planned missions as of May 31, 1979, for which experiments or investigations have been selected and NSSDC has at least minimal documentation.

Sections 4 and 5 are two indexes to the information presented in Sections 2 and 3. Section 4, "Index of Active and Planned Spacecraft and Experiments," is an alphabetical listing by spacecraft name, including both common and alternate names, of all active and planned spacecraft and experiments. (This listing serves as an index to the location of spacecraft and experiment descriptions and includes launch dates and current status-of-operation data.) Section 5, "Investigator Name Index," is a listing, ordered by last name, of the investigators or team members associated with the experiments and their current affiliations.

These major sections were generated from NSSDC automated files. Other relevant spacecraft without brief descriptions are given in Appendix A. Special investigators for some missions that could not conveniently be presented in Section 2 or 3 appear in Appendix B. Several words and phrases used in this document are defined in Appendix C. A more comprehensive list of the abbreviations and acronyms used in this document are included in Appendix D.

1.4 Availability of This Report

Upon request, NSSDC will provide copies of this report and future supplements to an individual or organization resident in the United States who can establish a need (in writing or by telephone) for this information. The same services are available to persons outside the United States through the World Data Center A for Rockets and Satellites (WDC-A-R&S). The official addresses for requests are printed on the inside front cover of this report.

Recipients are requested to inform potential users of the availability of this report. Because of continuing costs involved in publishing a document of this size on a periodic basis, NSSDC encourages individuals collocated in the same organization to share this document.

1.5 Request for Additions/Corrections

NSSDC continually strives to increase the usefulness of this report by improving the spacecraft and experiment descriptions and by including additional spacecraft and experiments as they become known to NSSDC. This report is complete and reasonably accurate concerning NASA and NASA-cooperative programs; however, descriptions of other spacecraft and experiments may be rather terse and incomplete because of a lack of information available to NSSDC. It should be noted that the information concerning the planned spacecraft and experiments is frequently general in nature and subject to change.

NSSDC would welcome comments as to errors or omissions in this report. Recommendations regarding the overall contents and organization of this report would also be appreciated. In particular, it is hoped that principal experimenters and project offices will cooperate in bringing such matters to NSSDC's attention.

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DESCRIPTIONS OF ACTIVE SPACECRAFT
AND EXPERIMENTS

2. DESCRIPTIONS OF ACTIVE SPACECRAFT AND EXPERIMENTS

This section contains descriptions of spacecraft and experiments pertinent to this report that were active sometime during the period July 1, 1978, to May 31, 1979. A few changes subsequent to this date may appear, depending on availability. The descriptions are sorted first by spacecraft common name. Within each spacecraft listing, experiments are ordered by the principal investigator's or team leader's last name. Explorer spacecraft prelaunch generic names are used as common names; e.g., IMP-H instead of Explorer 47. If the common name, as used by NSSDC, is not known, it can be found by referring to an alternate name found in the Index of Active and Planned Spacecraft and Experiments (Section 4).

Each spacecraft or experiment entry in this section is composed of two parts -- a heading and a brief description. The headings list characteristics of satellites and experiments. Definitions of many of the terms used in this section are included in Appendix C.

2.1 Contents of Spacecraft Entries

The heading for each spacecraft description in this section includes a set of initial orbit parameters. These parameters consist of orbit type, epoch date, orbit period, apoapsis, periapsis, and inclination for the spacecraft. No orbit parameters are listed for lander, flyby, and probe missions. In addition, the heading contains the spacecraft weight, launch date, launch site, launch vehicle, spacecraft common and alternate names, NSSDC ID code, sponsoring country and agency, and spacecraft personnel:

CODE CO	(general contact)
CODE MG	(program manager)
CODE MM	(mission manager)
CODE MS	(mission scientist)
CODE PC	(project coordinator)
CODE PD	(project director)
CODE PE	(project engineer)
CODE PM	(project manager)
CODE PS	(project scientist)
CODE SC	(program scientist)
CODE TD	(technical director)

The spacecraft brief description is immediately below each heading. This terminology is standard for NASA missions; the equivalent functions for the missions of other countries and/or agencies have been given the same position names.

2.2 Contents of Experiment Entries

Each experiment entry heading includes the experiment name, the NSSDC ID code, the investigative program, the investigation discipline, and the name and affiliation or location of the principal investigator (PI) or team leader (TL) for the experiment as well as other investigators (OI), team members (TM), deputy

team leader (DT), co-investigator (CI), or general contact (CO) associated with the experiment. The experiment brief description is immediately below each heading.

The investigative program may include one of the following NASA Headquarters division codes:

CODE EB	(Environmental Observations Division)
CODE EC	(Communications Division)
CODE EM	(Space Processing Division)
CODE ER	(Resource Observations Division)
CODE RS	(Space Systems Divisions)
CODE SB	(Life Sciences Division)
CODE SC	(Astrophysics Division)
CODE SL	(Planetary Division)
CODE ST	(Solar Terrestrial Division)

The addition of /CO-OP to any code indicates a cooperative effort between NASA and another agency.

2.3 Active Spacecraft and Experiment Descriptions

A spacecraft is included in the active section of this report if it had a status of "normal" or "partial" and a data acquisition rate of "standard" or "substandard" for any length of time since July 1, 1978. Experiments that meet this same criteria are included.

Active spacecraft with only passive experiments such as laser reflectors or those only used in upper atmospheric drag observations are included in Appendix A.

***** 1976-059A*****

SPACECRAFT COMMON NAME- 1976-059A
ALTERNATE NAMES- 08916, USAF OPERATIONAL SAT-76

NSSDC ID- 76-059A

LAUNCH DATE- 06/26/76 WEIGHT- KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 06/28/76
ORBIT PERIOD- 1436. MIN INCLINATION- 0. DEG
PERIAPSIS- 36000. KM ALT APOAPSIS- 36000. KM ALT

PERSONNEL
PM - SAMSO USAF-LAS
PS - W.D. EVANS LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
THE SATELLITE WAS PLACED IN A GEOSTATIONARY ORBIT WITH SOME STATION CHANGING CAPABILITIES. IT WAS SPIN STABILIZED AT 6 RPM WITH ITS SPIN VECTOR ALIGNED ALONG A RADIUS VECTOR TO THE EARTH BY AN ACTIVE CONTROL SYSTEM. REAL TIME PARTICLE DATA WERE USED BY SELECTED US AGENCIES FOR SPACE DISTURBANCE MONITORING AND FORECASTING.

----- 1976-059A, HIGBIE-----

INVESTIGATION NAME- ENERGETIC PARTICLE DETECTOR

NSSDC ID- 76-059A-01 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - P.R. HIGBIE LOS ALAMOS SCI LAB
OI - R.D. BELIAN LOS ALAMOS SCI LAB
OI - D.N. BAKER LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
THE ENERGETIC PARTICLE DETECTOR CONSISTED OF FOUR SOLID-STATE DETECTOR UNITS TO MEASURE ELECTRON, PROTON, AND ALPHA PARTICLE POPULATIONS. THE LOW-ENERGY ELECTRON (LEE) UNIT WAS MADE WITH FIVE SEPARATE ELEMENTS, EACH WITH A 5-DEG-HALF-ANGLE COLLIMATOR (HAC); THESE DETECTORS VIEWED AT 0 DEG, PLUS AND MINUS 30 DEG, AND PLUS AND MINUS 60 DEG LATITUDE RELATIVE TO THE SPACECRAFT EQUATORIAL PLANE. THE LEE MEASURED ELECTRONS ABOVE SEVEN THRESHOLD ENERGIES RANGING FROM 30 TO 300 KEV. THE HIGH-ENERGY ELECTRON UNIT CONSISTED OF ONE DETECTOR WITH AN 8-DEG HAC; FLUXES ABOVE SEVEN THRESHOLD ENERGIES RANGING FROM 0.2 TO 2.0 MEV WERE MEASURED. THE LOW-ENERGY PROTON UNIT CONSISTED OF A SINGLE DETECTOR WITH A GUARD SCINTILLATOR, A 5-DEG HAC, AND DISCRIMINATORS FOR 11 THRESHOLD ENERGIES RANGING FROM 50 TO 500 KEV. THE HIGH-ENERGY PROTON (HEP) UNIT WAS A THREE-ELEMENT TELESCOPE WITH A GUARD SCINTILLATOR AND A 15-DEG HAC THAT MEASURED PROTONS WITHIN 16 ENERGY INTERVALS RANGING FROM 0.3 TO 150 MEV. ON COMMAND, THE HEP COULD MEASURE ALPHA PARTICLES IN 16 ENERGY INTERVALS RANGING FROM 1.2 TO 600 MEV.

***** 1977-007A*****

SPACECRAFT COMMON NAME- 1977-007A
ALTERNATE NAMES- 09803, USAF OPERATIONAL SAT-77

NSSDC ID- 77-007A

LAUNCH DATE- 02/06/77 WEIGHT- KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 02/08/77
ORBIT PERIOD- 1436. MIN INCLINATION- 0. DEG
PERIAPSIS- 36000. KM ALT APOAPSIS- 36000. KM ALT

PERSONNEL
PM - SAMSO USAF-LAS
PS - W.D. EVANS LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
THE SATELLITE WAS PLACED IN A GEOSTATIONARY ORBIT WITH SOME STATION CHANGING CAPABILITIES. IT WAS SPIN STABILIZED AT 6 RPM WITH ITS SPIN VECTOR ALIGNED ALONG A RADIUS VECTOR TO THE EARTH BY AN ACTIVE CONTROL SYSTEM. REAL-TIME PARTICLE DATA WERE USED BY SELECTED US AGENCIES FOR SPACE DISTURBANCE MONITORING AND FORECASTING.

----- 1977-007A, HIGBIE-----

INVESTIGATION NAME- ENERGETIC PARTICLE DETECTOR

NSSDC ID- 77-007A-01 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - P.R. HIGBIE LOS ALAMOS SCI LAB
OI - R.D. BELIAN LOS ALAMOS SCI LAB
OI - D.N. BAKER LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
THE ENERGETIC PARTICLE DETECTOR CONSISTED OF FOUR SOLID-STATE DETECTOR UNITS TO MEASURE ELECTRON, PROTON, AND ALPHA PARTICLE POPULATIONS. THE LOW-ENERGY ELECTRON (LEE) UNIT WAS MADE WITH FIVE SEPARATE ELEMENTS, EACH WITH A 5-DEG-HALF-ANGLE COLLIMATOR (HAC); THESE DETECTORS VIEWED AT 0 DEG, PLUS AND MINUS 30 DEG, AND PLUS AND MINUS 60 DEG LATITUDE RELATIVE TO THE SPACECRAFT EQUATORIAL PLANE. THE LEE MEASURED ELECTRONS ABOVE SEVEN THRESHOLD ENERGIES RANGING FROM 30 TO 300 KEV. THE HIGH-ENERGY ELECTRON UNIT CONSISTED OF ONE DETECTOR WITH AN 8-DEG HAC; FLUXES ABOVE SEVEN THRESHOLD ENERGIES RANGING FROM 0.2 TO 2.0 MEV WERE MEASURED. THE LOW-ENERGY PROTON UNIT CONSISTED OF A SINGLE DETECTOR WITH A GUARD SCINTILLATOR, A 5-DEG HAC, AND DISCRIMINATORS FOR 11 THRESHOLD ENERGIES RANGING FROM 50 TO 500 KEV. THE HIGH-ENERGY PROTON (HEP) UNIT WAS A THREE-ELEMENT TELESCOPE WITH A GUARD SCINTILLATOR AND A 15-DEG HAC THAT MEASURED PROTONS WITHIN 16 ENERGY INTERVALS RANGING FROM 0.3 TO 150 MEV. ON COMMAND, THE HEP COULD MEASURE ALPHA PARTICLES IN 16 ENERGY INTERVALS RANGING FROM 1.2 TO 600 MEV.

***** AE-C*****

SPACECRAFT COMMON NAME- AE-C
ALTERNATE NAMES- S 6C, PL-721C
ATMOSPHERE EXPLORER-C, EXPLORER 51
6977

NSSDC ID- 73-101A

LAUNCH DATE- 12/16/73 WEIGHT- 658. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 12/16/73
ORBIT PERIOD- 132.3 MIN INCLINATION- 68.1 DEG
PERIAPSIS- 149.0 KM ALT APOAPSIS- 4294.0 KM ALT

PERSONNEL
MG - F.W. GAETANO NASA HEADQUARTERS
SC - E.R. SCHMERLING NASA HEADQUARTERS
PM - J.P. CORRIGAN NASA-GSFC
PS - N.W. SPENCER NASA-GSFC

BRIEF DESCRIPTION
THE PURPOSE OF THE AE-C MISSION WAS TO INVESTIGATE THE THERMOSPHERE, WITH EMPHASIS ON THE ENERGY TRANSFER, AND PROCESSES THAT GOVERN ITS STATE. THE STUDY OF PHOTOCHEMICAL PROCESSES ACCOMPANYING THE ABSORPTION OF SOLAR UV RADIATION IN THE EARTH'S ATMOSPHERE WAS ACCOMPLISHED BY MAKING CLOSELY COORDINATED MEASUREMENTS OF REACTING CONSTITUENTS AND THE SOLAR INPUT. THE AE SPACECRAFT WAS A MULTI-SIDED POLYHEDRON WITH A DIAMETER OF APPROXIMATELY 1.4 M AND WEIGHED ABOUT 660 KG INCLUDING 85 KG OF INSTRUMENTATION. THE INITIAL ELLIPTICAL ORBIT WAS ALTERED MANY TIMES IN THE FIRST YEAR OF LIFE BY MEANS OF AN ONBOARD PROPULSION SYSTEM EMPLOYING A 3.5 LB THRUSTER. THE PURPOSE OF THESE CHANGES WAS TO ALTER THE PERIGEE HEIGHT TO 129 KM. AFTER THIS PERIOD, THE ORBIT WAS CIRCULARIZED AND WAS RAISED PERIODICALLY TO ABOUT 390 KM WHEN IT WOULD DECAY TO 250 KM ALTITUDE. DURING THE FIRST YEAR, THE LATITUDE OF PERIGEE MOVED FROM ABOUT 10 DEG N UP TO 68 DEG N AND THEN DOWN TO ABOUT 60 DEG S. DURING THIS PERIOD ABOUT TWO CYCLES THROUGH ALL LOCAL TIMES WERE COMPLETED. THE SPACECRAFT COULD BE OPERATED IN EITHER OF TWO MODES - SPINNING AT A NOMINAL 4 RPM OR DESPUN TO 1 REVOLUTION PER ORBIT. THE SPIN AXIS WAS PERPENDICULAR TO THE ORBIT PLANE. POWER WAS SUPPLIED BY A SOLAR CELL ARRAY. THE SPACECRAFT USED A PCM TELEMETRY DATA SYSTEM THAT OPERATED IN REAL TIME OR IN A TAPE RECORDER MODE. MORE DETAILS CAN BE FOUND ON PP. 263-269 OF 'RADIO SCIENCE', 8, 4, APRIL 1973. THE PAYLOAD INCLUDED INSTRUMENTATION FOR THE MEASUREMENT OF SOLAR UV; THE COMPOSITION OF POSITIVE IONS AND NEUTRAL PARTICLES; THE DENSITY AND TEMPERATURE OF NEUTRAL PARTICLES, POSITIVE IONS AND ELECTRONS; THE MEASUREMENT OF AIRGLOW EMISSIONS, PHOTOELECTRON ENERGY SPECTRA, AND PROTON AND ELECTRON FLUXES UP TO 25 KEV.

----- AE-C, BARTH-----

INVESTIGATION NAME- ULTRAVIOLET NITRIC-OXIDE (UVNO)

ORIGINAL PAGE 13
OF POOR QUALITY

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - C.A. BARTH

U OF COLORADO

BRIEF DESCRIPTION

THIS ULTRAVIOLET NITRIC-OXIDE EXPERIMENT (UVNO) CONSISTED OF A TWO-CHANNEL FIXED-GRATING EBERT SPECTROMETER WHICH MEASURED THE AIRGLOW IN THE (1, 0) GAMMA BAND IN A 12-A REGION CENTERED AT 2150 Å. THE OBSERVED INTENSITY WAS PRODUCED BY RESONANCE FLUORESCENCE BY SUNLIGHT OF THE NITRIC-OXIDE MOLECULES IN THE INSTRUMENT'S FIELD OF VIEW. THE INTENSITY PROFILES OBTAINED YIELDED ALTITUDE PROFILES OF NITRIC-OXIDE DENSITY AS A FUNCTION OF TIME AND LOCATION. PROFILES WERE MEASURED ALONG THE TRACK OF THE SATELLITE AT ALL TIMES WHEN IT WAS ON THE SUNLIT SIDE OF THE EARTH. THE REMOTE SENSING CHARACTER OF THE UVNO EXPERIMENT PERMITTED MEASUREMENTS OF NITRIC-OXIDE TO BE MADE AT ALTITUDES BOTH ABOVE AND BELOW SATELLITE PERIGEE. AS THE SPACECRAFT SPUN, THE SPECTROMETER, WHICH LOOKED OUTWARD THROUGH THE RIM OF THE SATELLITE, REPEATEDLY HAD ITS FIELD OF VIEW CARRIED DOWN THROUGH THE ATMOSPHERE ONTO THE EARTH'S LIMB, AND ALTITUDE PROFILES OF THE EMITTED AIRGLOW INTENSITY WERE OBTAINED. BELOW SOME ALTITUDE THE MEASURED SIGNAL AT 2150 Å WAS CONTAMINATED BY RAYLEIGH SCATTERED SUNLIGHT. TO CORRECT FOR THIS CONTAMINATION, A SECOND CHANNEL MEASURED ONLY SCATTERED LIGHT INTENSITY IN A 12-A REGION CENTERED AT 2190 Å. THE TWO CHANNELS WERE OPTICALLY AND ELECTRICALLY INDEPENDENT. NITRIC-OXIDE AIRGLOW INTENSITY WAS DETERMINED BY TAKING THE DIFFERENCE BETWEEN THESE TWO MEASUREMENTS. FROM THE CORRECTED SIGNAL, NITRIC-OXIDE DENSITY PROFILES WERE OBTAINED BETWEEN APPROXIMATELY 80 KM AND 250 KM. THE SENSOR'S SPHERICAL FUSED QUARTZ TELESCOPE MIRROR HAD A 125-MM FOCAL LENGTH, AND FOCUSED INCIDENT LIGHT ON THE ENTRANCE SLIT OF THE SPECTROMETER. FROM THIS SLIT THE LIGHT STRUCK ONE HALF OF THE EBERT MIRROR AND WAS COLLMATED ONTO THE GRATING. THE 3600-LINES-PER-MM GRATING RETURNED IT COLLIMATED TO THE OTHER HALF OF THE EBERT MIRROR, AND THE LIGHT WAS FOCUSED ON TWO EXIT SLITS. THE SPECTROMETER FIELD OF VIEW WAS 0 DEG 15 MIN BY 4 DEG 39 MIN. IN NORMAL OPERATION EACH CHANNEL WAS INTEGRATED FOR 20.8 MS AND WAS READ OUT ALTERNATELY AT 10.4-MS INTERVALS. THE INSTRUMENT HAD LINEAR RESPONSE CHARACTERISTICS, AND THE OBSERVATION OF A 1.1E13 PHOTONS PER SEC SQ M (1.1E3 RAYLEIGH) EMISSION RATE PRODUCED, ON THE AVERAGE, 100 COUNTS PER INTEGRATION PERIOD IN THE 2150-Å CHANNEL AND 60 COUNTS IN THE 2190-Å CHANNEL. THE INSTRUMENT WAS PROTECTED AGAINST CONTAMINATION FROM INTERNAL SCATTERING OF OFF-AXIS UNDISPERSED LIGHT. MORE EXPERIMENT DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 379-385, APRIL 1973.

----- AE-C, BRACE-----

INVESTIGATION NAME- CYLINDRICAL ELECTROSTATIC PROBES (CEP)

NSSDC ID- 73-101A-01

INVESTIGATIVE PROGRAM
CODE STINVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL

PI - L.H. BRACE
OI - R.F. THEISNASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE CEP CONSISTED OF TWO IDENTICAL INSTRUMENTS DESIGNED TO MEASURE ELECTRON TEMPERATURES, ELECTRON AND ION CONCENTRATIONS, ION MASS, AND SPACECRAFT POTENTIAL. ONE PROBE WAS ORIENTED ALONG THE SPIN AXIS OF THE SPACECRAFT (NORMALLY PERPENDICULAR TO THE ORBIT PLANE), AND THE OTHER RADially SO THAT IT COULD OBSERVE IN THE DIRECTION OF THE VELOCITY VECTOR ONCE EACH 15-S SPIN PERIOD. EACH INSTRUMENT WAS A RETARDING POTENTIAL LANGMUIR PROBE DEVICE THAT PRODUCED A CURRENT-VOLTAGE (I-V) CURVE FOR A KNOWN VOLTAGE PATTERN PLACED ON THE COLLECTOR. ELECTROMETERS WERE USED TO MEASURE THE CURRENT. THERE WERE TWO SYSTEMS OF OPERATION (ONE WITH TWO MODES AND ANOTHER WITH THREE MODES) USING COLLECTOR VOLTAGE PATTERNS BETWEEN PLUS AND MINUS 5 VOLTS. MOST MODES INVOLVED AN AUTOMATIC OR FIXED ADJUSTMENT OF COLLECTOR VOLTAGE LIMITS (AND/OR ELECTROMETER OUTPUT) SUCH THAT THE REGION OF INTEREST ON THE I-V PROFILE PROVIDED HIGH RESOLUTION. EACH SYSTEM WAS DESIGNED FOR USE WITH ONLY ONE OF THE PROBES, BUT THEY COULD BE INTERSWITCHED TO PROVIDE BACKUP REDUNDANCY. THE BEST MEASUREMENTS IN THE MOST FAVORABLE MODES PROVIDED 1 S TIME RESOLUTION; ELECTRON TEMPERATURE BETWEEN 300 AND 1.0E4 DEG K (10 PERCENT ACCURACY); ION DENSITY BETWEEN 1.0E4 AND 1.0E7 PER CUBIC CM (10-20 PERCENT ACCURACY); ELECTRON DENSITY BETWEEN 50 AND 1.0E6 PER CUBIC CM; AND ION MASS AT ION DENSITIES ABOVE 1.0E4 PER CUBIC CM. EACH PROBE HAD A COLLECTOR ELECTRODE EXTENDING FROM THE CENTRAL AXIS OF A CYLINDRICAL GUARD RING. THE 2.5-CM-LONG GUARD RING WAS AT THE END OF A 25-CM BOOM, AND THE COLLECTOR EXTENDED ANOTHER 7.5 CM BEYOND THE GUARD RING. THE BOOM, GUARD, AND COLLECTOR WERE 0.2 CM IN DIA. MORE DETAILED INFORMATION CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 297, APRIL 1973.

----- AE-C, BRINTON-----

INVESTIGATION NAME- BENNETT ION-MASS SPECTROMETER (BIMS)

NSSDC ID- 73-101A-11

INVESTIGATIVE PROGRAM
CODE STINVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - H.C. BRINTON
OI - L.R. SCOTT
OI - M.W. PHARO, III
OI - H.A. TAYLOR, JR.NASA-GSFC
NOAA-NESS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT WAS FLOWN TO MEASURE, THROUGHOUT THE AE ORBIT, THE INDIVIDUAL CONCENTRATIONS OF ALL THERMAL ION SPECIES IN THE MASS RANGE OF 1 TO 72 ATOMIC MASS UNITS (U), AND IN THE AMBIENT DENSITY RANGE FROM 5 IONS PER CUBIC CM TO 5.0E6 IONS PER CUBIC CM. ANY COMBINATION OF THE FOLLOWING THREE MASS RANGES, WHICH WERE EXPRESSED IN U, WERE SELECTED BY GROUND COMMAND -- RANGE A - 4 TO 1, RANGE B - 18 TO 2, RANGE C - 72 TO 8. EACH RANGE WAS NORMALLY SCANNED IN 1.6 S (APPROXIMATELY 12 KM ALONG ORBIT), BUT THE SCAN TIME PER RANGE WAS INCREASED TO 5.1 S BY COMMAND. NORMAL OPERATION CONSISTED IN SEQUENCE ABCABC (72 TO 1 U IN 4.8 S). LABORATORY AND IN-FLIGHT DETERMINATION OF SPECTROMETER EFFICIENCY AND MASS DISCRIMINATION PERMITTED DIRECT CONVERSION OF MEASURED ION CURRENTS TO AMBIENT CONCENTRATIONS. THE EXPERIMENT'S FOUR PRIMARY MECHANICAL COMPONENTS WERE -- GUARD RING AND ION-ANALYZER TUBE, COLLECTOR AND PREAMPLIFIER ASSEMBLY, VENT, AND MAIN ELECTRONICS HOUSING. THE GUARD RING WAS NORMALLY AT GROUND POTENTIAL, BUT IT COULD BE PLACED AT -6 V BY COMMAND IF DESIRABLE, E.G., IF THE SPACECRAFT ACQUIRED A POSITIVE CHARGE. A THREE-STAGE BENNETT TUBE WITH 7 TO 5 CYCLE DRIFT SPACES WAS FLOWN AND WAS MODIFIED TO PERMIT ION CONCENTRATION MEASUREMENTS TO BE OBTAINED DOWN TO 120-KM ALTITUDE. SPECIFICALLY, A VENT WAS PROVIDED AT THE REAR OF THE SPECTROMETER, AND THE USUAL FLAT-DISK ION-CURRENT COLLECTOR WAS REPLACED WITH A STACK OF WIRE-MESH GRIDS. THE FREQUENCY OF THE 30 V PEAK-TO-PEAK R.F. VOLTAGE VARIED WITH THE MASS RANGE MEASURED -- RANGE A - 10 MHZ, RANGE B - 5 MHZ, AND RANGE C - 2.5 MHZ. INTO THE VACUUM-TIGHT ALUMINA-CERAMIC CYLINDRICAL ANALYZER TUBE A SERIES OF 16 PARALLEL TUNGSTEN-MESH GRIDS WERE BRAZED. PRIMARY ANALOG INSTRUMENT OUTPUT WAS A COMPRESSED ION CURRENT SPECTRUM WHICH DISPLAYED THE FULL DYNAMIC RANGE OF THE AMPLIFIER SYSTEM ON A SINGLE TELEMETRY CHANNEL. ONBOARD DATA PROCESSING PROVIDED A READOUT OF PRIMARY EXPERIMENT DATA IN THE FORM OF TWO DIGITAL WORDS FOR EACH PEAK IN THE ION SPECTRUM. ONE 8-BIT WORD INDICATED PEAK AMPLITUDE (CURRENT) AND THE OTHER 8-BIT WORD IDENTIFIED SWEEP POSITION, I.E., SPECIES IDENTIFICATION. MORE COMPLETE DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 323-332, APRIL 1973.

----- AE-C, CHAMPION-----

INVESTIGATION NAME- ATMOSPHERIC DENSITY ACCELEROMETER (MESA)

NSSDC ID- 73-101A-02

INVESTIGATIVE PROGRAM
CODE STINVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL

PI - K.S.W. CHAMPION
OI - F.A. MARCOSUSAF GEOPHYS LAB
USAF GEOPHYS LAB

BRIEF DESCRIPTION

MESA (MINIATURE ELECTROSTATIC ANALYZER), OBTAINED DATA ON THE NEUTRAL DENSITY OF THE ATMOSPHERE IN THE ALTITUDE RANGE OF 120 KM TO 400 KM BY THE MEASUREMENTS OF SATELLITE DECELERATION DUE TO AERODYNAMIC DRAG. THE INSTRUMENT CONSISTED OF THREE SINGLE-AXIS ACCELEROMETERS, MOUNTED MUTUALLY AT RIGHT ANGLES, TWO IN THE SPACECRAFT X-Y PLANE AND THE OTHER ALONG THE Z-AXIS. THE INSTRUMENT DETERMINED THE APPLIED ACCELERATION FROM THE ELECTROSTATIC FORCE REQUIRED TO RECENTER A PROOF MASS. THE OUTPUT OF THE DEVICE WAS A DIGITAL PULSE RATE PROPORTIONAL TO THE APPLIED ACCELERATION. THE MEASUREMENTS ALLOWED DETERMINATION OF THE DENSITY OF THE NEUTRAL ATMOSPHERE, MONITORED THE THRUST OF THE ORBIT-ADJUST PROPULSION SYSTEM (OAPS), DETERMINED THE SATELLITE MINIMUM ALTITUDE, MEASURED SPACECRAFT ROLL, AND PROVIDED SOME ATTITUDE-SENSING INFORMATION. SPACECRAFT NUTATIONS OF LESS THAN 0.01 DEGREES WERE MONITORED. THE INSTRUMENT HAD THREE SENSITIVITY RANGES -- 8.E-3 EARTH'S GRAVITY (G) IN OAPS MONITOR MODE; 4.E-4 G BETWEEN 120 KM (PLUS OR MINUS 2 PERCENT) AND 280 KM (PLUS OR MINUS 10 PERCENT); AND 2.E-5 G BETWEEN 180 KM (PLUS OR MINUS 2 PERCENT) AND 400 KM (PLUS OR MINUS 10 PERCENT). NUMBERS IN PARENTHESES REPRESENT ERRORS; IN ADDITION, THERE MAY BE A SYSTEMATIC ERROR OF UP TO PLUS OR MINUS 5 PERCENT DUE TO DRAG COEFFICIENT UNCERTAINTY. THE HIGHEST ALTITUDE WAS DETERMINED ASSUMING THE INSTRUMENT COULD SENSE TO 0.2 PERCENT OF FULL SCALE.

----- AE-C, DOERING-----

INVESTIGATION NAME- PHOTOELECTRON SPECTROMETER (PES)

NSSDC ID- 73-101A-03

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL

PI - J.P. DOERING
OI - C.O. BOSTROM

JOHNS HOPKINS U
APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO PROVIDE INFORMATION ON THE INTENSITY, ANGULAR DISTRIBUTION, ENERGY SPECTRUM, AND NET FLOW ALONG FIELD LINES, OF ELECTRONS IN THE THERMOSPHERE WITH ENERGIES BETWEEN 2 AND 500 EV. THE INSTRUMENT CONSISTED OF TWO IDENTICAL OPPOSITELY DIRECTED HEMISPHERICAL ELECTROSTATIC ANALYZERS. EACH SPECTROMETER HAD A RELATIVE ENERGY RESOLUTION OF PLUS OR MINUS 2.5 PERCENT AND A GEOMETRIC FACTOR ON THE ORDER OF 0.001 SQ CM SR, INDEPENDENT OF ELECTRON ENERGY. THREE SEPARATE ENERGY RANGES COULD BE SENSED -- 0 TO 25 EV, 0 TO 100 EV, OR 0 TO 500 EV. MEASUREMENTS FROM THESE INTERVALS COULD BE SEQUENCED IN FIVE DIFFERENT WAYS. DATA COULD BE TAKEN FROM EITHER SENSOR SEPARATELY, OR ALTERNATELY WITH TIME RESOLUTION VARYING FROM 0.25 TO 8 S. THERE WERE TWO DEFLECTION VOLTAGE SCAN RATES DETERMINED BY SPACECRAFT CLOCK. THIS VOLTAGE WAS CHANGED IN 64 STEPS, AND WAS DONE AT 4 OR 16 STEPS PER TELEMETRY FRAME. WITH 16 FRAMES/S, THIS ALLOWED A CHOICE OF EITHER ONE 64-POINT SPECTRUM, OR FOUR 16-POINT SPECTRA IN 1 S. THE LONGEST (8 S) CYCLE OF DATA INVOLVED OBSERVATIONS USING INCREASING VOLTAGE STEPS FOR THE LOWEST, MIDDLE, LOWEST, THEN HIGHEST ENERGY RANGES (IN THAT ORDER) FOR 1 S EACH. A REPEAT FOR DECREASING VOLTAGE STEP COMPLETED THE CYCLE. A MORE DETAILED DESCRIPTION OF THIS EXPERIMENT MAY BE FOUND IN 'RADIO SCIENCE,' 8, 4, 387-392, APRIL 1973.

----- AE-C, HANSON-----

INVESTIGATION NAME- RETARDING POTENTIAL ANALYZER/DRIFT METER (RPA)

NSSDC ID- 73-101A-04

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL

PI - W.B. HANSON
OI - D.R. ZUCCARO
OI - S. SANATANI

U OF TEXAS, DALLAS
U OF TEXAS, DALLAS
U OF TEXAS, DALLAS

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO DETERMINE OBSERVATIONS OF VECTOR ION DRIFT VELOCITIES, ION CONCENTRATION AND TEMPERATURE, AND SPACECRAFT POTENTIAL. AN IONOSPHERIC IRREGULARITY INDEX WAS ALSO OBTAINED FROM THE ION CONCENTRATION SENSOR. THE EXPERIMENT CONSISTED OF A RETARDING POTENTIAL ANALYZER WITH FOUR PLANAR SENSOR HEADS. THE SENSOR HEAD USED FOR ION DRIFT MEASUREMENTS WAS CO-LOCATED WITH ANOTHER HEAD, AND ALL WERE SPACED NEARLY EQUALLY, LOOKING OUTWARD FROM THE SATELLITE EQUATOR. SINCE THE SATELLITE SPIN AXIS WAS PERPENDICULAR TO THE ORBIT PLANE, THESE HEADS COULD OBSERVE ALONG THE SPACECRAFT VELOCITY VECTOR IN EITHER THE SPIN OR DESPIN MODE OF THE SPACECRAFT. THE PRIMARY PURPOSE OF THIS EXPERIMENT WAS TO PROVIDE ACCURATE ION TEMPERATURES WITH OTHER MEASUREMENTS BEING OF SECONDARY IMPORTANCE. THREE OF THE SENSOR HEADS WERE SIMILAR. THEY HAD TWO GROUNDED ENTRANCE GRIDS, TWO RETARDING GRIDS, A SUPPRESSOR GRID, A SHIELD GRID, AND A COLLECTOR. A LINEAR SWEEP VOLTAGE (32 OR 22 TO 0 V, UP OR DOWN) WAS NORMALLY APPLIED TO THE RETARDING GRIDS IN 0.75 S. INTERPRETATION OF THE RESULTING CURRENT-VOLTAGE PROFILES PROVIDED THE ION TEMPERATURE, THE ION AND ELECTRON CONCENTRATION, SOME ION COMPOSITION INFORMATION, VEHICLE POTENTIAL AND PLASMA DRIFT VELOCITY PARALLEL TO THE VELOCITY VECTOR. TWO OF THE THREE SIMILAR SENSORS HAD AN ADDITIONAL GRID BETWEEN THE ENTRANCE AND RETARDING GRIDS IN ORDER TO PROTECT INNER GRIDS FROM ION BOMBARDMENT DURING ELECTRON MEASUREMENTS. THE OTHER SIGNIFICANT FEATURE OF THESE TWO SENSORS WAS THAT A SMALL POSITIVE COLLECTOR BIAS COULD BE APPLIED TO ASSURE ADEQUATE ACCESS OF THERMAL ELECTRONS TO THE COLLECTOR. WITH THE RETARDING GRID AT CONSTANT ZERO VOLTS, CURRENT CHANGES COULD BE OBSERVED FOR 3-S PERIODS TO OBTAIN GRADIENTS OF ION CONCENTRATION. ELECTRON PARAMETERS WERE MEASURED IN A MANNER SIMILAR TO IONS EXCEPT FOR THE LINEAR SWEEP VOLTAGE (-3 OR -2 TO 0 V, UP OR DOWN) RANGE. IONS IN MASS RANGES 1 TO 4, 14 TO 16, 24 TO 32 AND GREATER THAN 40 U (40 AMU) COULD BE IDENTIFIED. THE FOURTH SENSOR HEAD WAS FOR THE ION-DRIFT VELOCITY MEASUREMENTS, AND CONSISTED OF FOUR GROUNDED GRIDS, A NEGATIVELY BIASED SUPPRESSOR GRID, AND A FOUR-SEGMENT COLLECTOR. DIFFERENCES IN VARIOUS COLLECTOR SEGMENT CURRENTS PROVIDED ION-DRIFT DIRECTIONAL COMPONENT INFORMATION. MORE DETAILS OF THIS EXPERIMENT ARE AVAILABLE IN 'RADIO SCIENCE,' 8, 4, 333-339, APRIL 1973.

----- AE-C, HAYS-----

INVESTIGATION NAME- VISIBLE AIRGLOW PHOTOMETER (VAE)

NSSDC ID- 73-101A-14

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - P.B. HAYS
OI - G.G. SHEPHERD

U OF MICHIGAN
YORK U

BRIEF DESCRIPTION

THIS EXPERIMENT CONTAINED A FILTER PHOTOMETER DESIGNED TO MONITOR VARIOUS AIRGLOW AND AURORAL FEATURES WHICH LIE IN THE SPECTRAL RANGE BETWEEN 3000 A AND 7500 A. THE PRIMARY INFORMATION OBTAINED FROM THIS EXPERIMENT WAS THE RATES OF EXCITATION OF THE ATOMIC AND MOLECULAR CONSTITUENTS OF THE THERMOSPHERE. FOR THE AE-C MISSION, THE FOLLOWING SIX SPECIFIC LINES AND BANDS WERE CHOSEN FOR STUDY SINCE THEY PLAY AN IMPORTANT ROLE IN THE PHOTOCHEMICAL ENERGY BALANCE OF THE ATMOSPHERE -- 3371 A, 4278 A, 5200 A, 5577 A, 6300 A, AND 7319 A. THE EMISSIONS WERE MEASURED IN PAIRS -- 5577 AND 6300, 7319 AND CALIB, 3371 AND 5577, 5200 AND 7319, 4278 AND 3371, CALIB AND 5200, AND 6300 AND 4278. TWO OPTICAL SYSTEMS VIEWED AT RIGHT ANGLES TO EACH OTHER. EACH ONE EMPLOYED A COMBINATION OF A SIMPLE OBJECTIVE LENS AND FIELD STOP TO DEFINE THE FIELD OF VIEW, AND EACH CONTAINED A MULTISTAGE LIGHT BAFFLE. THE WIDE-ANGLE HIGH-SENSITIVITY SYSTEM (DESIGNATED CHANNEL 2) HAD A FIELD OF VIEW OF 3 DEG HALF-ANGLE, AND WAS USED TO MEASURE THE NIGHTGLOW, DAYGLOW ABOVE THE SATELLITE, AND OTHER WEAK EMISSION FEATURES. THE LESS SENSITIVE SYSTEM (DESIGNATED CHANNEL 1) HAD A FIELD OF VIEW OF APPROXIMATELY 3/4 DEG HALF-ANGLE AND WAS USED FOR DAYGLOW AND NIGHTGLOW HORIZON MEASUREMENTS, AS WELL AS DISCRETE AURORAL FEATURES WHICH SHOWED STRONG SPATIAL GRADIENTS. BOTH OPTICAL CHANNELS HAD A DIAMETER OF 2.2 CM. THEY SHARED A FILTER WHEEL THAT CONTAINED SIX INTERFERENCE FILTERS AT THE WAVELENGTHS IDENTIFIED ABOVE, AND TWO OTHER POSITIONS. ONE WAS A DARK POSITION FOR NOISE MEASUREMENTS, AND THE OTHER WAS A CALIBRATE POSITION. THE DYNAMIC RANGE OF THE INSTRUMENT WAS 1.E16 PER SEC SQ M (1.E6 RAYLEIGH). IN ORDER THAT THE SENSORS BE ABLE TO RESPOND IN A FRACTION OF A SECOND TO LARGE CHANGES IN SURFACE BRIGHTNESS WITHOUT ANY NOTICEABLE ENHANCEMENT IN THE BACKGROUND COUNT RATE, EACH ONE CONTAINED A 1/100 ATTENUATOR AND AN ELECTRONIC CIRCUIT TO BACK-BIAS THE CATHODE. WITH THESE PROTECTIVE FEATURES IT WAS POSSIBLE TO MEASURE A DARK FEATURE WITH NO APPARENT ENHANCEMENT IN BACKGROUND WITHIN 120 MS AFTER A DIRECT VIEW OF THE SUN. PHOTONS REACHING THE CATHODE WERE RECORDED USING A PULSE-COUNTING SYSTEM. FOR MORE EXPERIMENT DETAILS, SEE 'RADIO SCIENCE,' 8, 4, 369-377, APRIL 1973.

----- AE-C, HINTEREGGER-----

INVESTIGATION NAME- SOLAR EUV SPECTROPHOTOMETER (EUVS)

NSSDC ID- 73-101A-06

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES
SOLAR PHYSICS

PERSONNEL

PI - H.E. HINTEREGGER
OI - D.E. BEDO
OI - L.A. HALL
OI - C.W. CHAGNON
OI - J.E. MANSON

USAF GEOPHYS LAB
USAF GEOPHYS LAB
USAF GEOPHYS LAB
USAF GEOPHYS LAB
USAF GEOPHYS LAB

BRIEF DESCRIPTION

EUVS WAS USED TO OBSERVE THE VARIATIONS IN THE SOLAR EUV FLUX IN THE WAVELENGTH RANGE FROM 140 TO 1850 A AND THE ATMOSPHERIC ATTENUATION AT VARIOUS FIXED WAVELENGTHS. THIS PROVIDED QUANTITATIVE ATMOSPHERIC STRUCTURE AND COMPOSITION DATA. THE INSTRUMENT CONSISTED OF 24 GRAZING-INCIDENCE GRATING MONOCHROMATORS, USING PARALLEL-SLIT SYSTEMS FOR ENTRANCE COLLIMATION AND PHOTOELECTRIC DETECTORS AT THE EXIT SLITS. TWELVE OF THESE MONOCHROMATORS HAD WAVELENGTH SCAN CAPABILITY, EACH WITH 128 SELECTABLE WAVELENGTH POSITIONS, WHICH COULD ALSO AUTOMATICALLY STEP SCAN THROUGH THESE POSITIONS. THE OTHER 12 MONOCHROMATORS OPERATED AT FIXED WAVELENGTHS WITH FIELDS OF VIEW SMALLER THAN THE FULL SOLAR DISK TO AID IN THE ATMOSPHERIC ABSORPTION ANALYSIS. THE SPECTRAL RESOLUTION VARIED FROM 2 TO 54 A DEPENDING UPON THE PARTICULAR INSTRUMENT. THE FIELD OF VIEW VARIED FROM 60 X 60 ARC MIN DOWN TO 3 X 6 ARC MIN. ALL 24 MONOCHROMATOR-ENTRANCE AXES WERE CO-ALIGNED PARALLEL. A SOLAR POINT SYSTEM COULD POINT TO 256 DIFFERENT POSITIONS, EXECUTE A 16-STEP ONE-DIMENSIONAL SCAN OR A FULL 256-STEP RASTER. THE TIME RESOLUTION VARIED FROM 0.5 S FOR OBSERVING 12 FIXED WAVELENGTHS UP TO 256 S FOR PROGRAMMING THE EUVS THROUGH ALL POSSIBLE MODES. MORE DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 349-360, APRIL 1973.

----- AE-C, HOFFMAN-----

INVESTIGATION NAME- MAGNETIC ION-MASS SPECTROMETER (MIMS)

NSSDC ID- 73-101A-10

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - J.H. HOFFMAN

U OF TEXAS, DALLAS

BRIEF DESCRIPTION

A MAGNETIC ION MASS SPECTROMETER WAS FLOWN TO MEASURE IN SITU THE CONCENTRATIONS OF THE AMBIENT ION SPECIES IN THE MASS RANGE FROM 1 TO 90 ATOMIC MASS UNITS (U). MOUNTED ON THE SATELLITE EQUATOR NORMAL TO THE SPIN AXIS, THE ENTRANCE APERTURE FACED FORWARD WHEN THE SPACECRAFT WAS IN THE DESPUN MODE. THE ELECTRIC AND MAGNETIC FIELDS WERE ARRANGED TO PRODUCE A MASS SPECTRUM ALONG THE FOCAL PLANE FOLLOWING THE MAGNETIC ANALYZER. THREE SLITS WERE PLACED ALONG THE FOCAL PLANE IN APPROPRIATE PLACES TO SIMULTANEOUSLY COLLECT IONS IN THE MASS RATIOS 1 TO 4 TO 16 U. IONOSPHERIC IONS WERE ACCELERATED INTO THE ANALYZER SYSTEM BY A NEGATIVE VOLTAGE THAT VARIED FROM -1060 TO -225 V. THE THREE MASS RANGES MEASURED SIMULTANEOUSLY WERE 1 TO 4, 4 TO 16, AND 16 TO 64 U. FOLLOWING EACH SLIT WAS AN ELECTRON MULTIPLIER AND A LOGARITHMIC ELECTROMETER-AMPLIFIER DETECTOR. THE DETECTOR OUTPUT COULD BE MEASURED DIRECTLY FOR AN ANALOG OUTPUT, OR IT COULD BE FED TO A 'PEAK' CIRCUIT THAT DETERMINED THE AMPLITUDE OF EACH PEAK IN THE SPECTRUM. ONLY THE AMPLITUDE OF EACH PEAK WAS TELEMETERED IN THE PRIMARY PEAKS MODE, AND IN THIS MODE THE TIME REQUIRED TO SIMULTANEOUSLY SWEEP ALL THREE MASS RANGES WAS 1 S. OTHER MODES OF OPERATION WERE POSSIBLE. IN THE ANALOG SHORT MODE, THE THREE MASS RANGES WERE SWEEPED IN 3 S, ALTERNATING WITH 1-S 'PEAKS' MODE SCANS. AN 8-S SWEEP WAS REQUIRED IN THE ANALOG LONG MODE, AGAIN ALTERNATING WITH 1-S PEAKS MODE SCAN. AN OPTION EXISTED IN THE LOCKED MODE TO CONTINUOUSLY MEASURE ANY SET OF MASS NUMBERS IN THE RATIO 1 TO 4 TO 16 TO GIVE HIGH SPATIAL RESOLUTION. MORE EXPERIMENT DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 315-322, APRIL 1973.

----- AE-C, HOFFMAN-----

INVESTIGATION NAME- LOW-ENERGY ELECTRONS (LEE)

NSSDC ID- 73-101A-12

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - R.A. HOFFMAN
OI - D.S. EVANS
OI - J.L. BURCH

NASA-GSFC
NOAA-ERL
U OF TEXAS, SAN ANTONIO

BRIEF DESCRIPTION

THIS EXPERIMENT FURNISHED DIRECT MEASUREMENTS OF THE ENERGY INPUT INTO THE UPPER ATMOSPHERE DUE TO ELECTRONS AND PROTONS IN THE ENERGY RANGE OF 0.2 TO 25 KEV. THE EXPERIMENT ACQUIRED DIFFERENTIAL MEASUREMENTS OF THE ENERGY INFLUX AND ANGULAR DISTRIBUTION. THERE WERE TWO DETECTORS MEASURING ELECTRONS AND PROTONS FROM 0.2 TO 25 KEV IN 16 LOGARITHMICALLY SPACED STEPS, AND ONE DETECTOR MEASURING 5 KEV ELECTRONS CONTINUOUSLY. EACH DETECTOR CONSISTED OF A CYLINDRICAL ELECTROSTATIC ANALYZER FOR SPECIES AND ENERGY SELECTION, AND A SPIRALTRON ELECTRON MULTIPLIER FOR PARTICLE DETECTION. ENERGY DISTRIBUTIONS WERE OBTAINED BY APPLYING DIFFERENT FIXED OR STEPPED VOLTAGES TO THE DEFLECTION PLATES; DISTRIBUTIONS IN ANGLE WERE MEASURED BY USING THE SPACECRAFT SPIN AND MOUNTING THE ANALYZERS AT AN ANGLE. IN THE SPINNING MODE, ANGULAR DISTRIBUTIONS OF BOTH PROTONS AND ELECTRONS WERE OBTAINED. IN THE DESPUN MODE, MEASUREMENTS WERE OBTAINED AT 45 DEG TO THE SPACECRAFT EQUATOR, AND RADIIALLY AWAY FROM THE EARTH. DETECTOR LOOK ANGLES WERE CHOSEN TO GIVE OPTIMUM MAGNETIC PITCH-ANGLE COVERAGE WHEN THE SPACECRAFT WAS MOVING EITHER POLEWARD OR EQUATORWARD. ALL DETECTORS WERE IDENTICAL IN CONSTRUCTION AND USED 1- X 6-MM ENTRANCE APERTURES. ONLY ONE (MONITOR) MODE WAS AVAILABLE. IT CONSISTED OF CONTINUOUS MEASUREMENT OF 5-KEV ELECTRONS AT 45 DEG TO THE SPACECRAFT EQUATOR (+Y) AXIS. COUNTS WERE ACCUMULATED OVER 55.7 MS AND READ OUT EACH MAIN TELEMETRY FRAME (62.5 MS). THE TWO STEPPED DETECTORS MOVED ONE ENERGY STEP ONCE EACH MAIN FRAME WITH THE SAME ACCUMULATION TIME REQUIRING ABOUT 1 S FOR A COMPLETE CYCLE OF STEPS. MORE COMPLETE DETAILS OF THIS EXPERIMENT MAY BE FOUND IN 'RADIO SCIENCE,' 8, 4, 393-400, APRIL 1973.

----- AE-C, SPENCER-----

INVESTIGATION NAME- NEUTRAL ATMOSPHERE TEMPERATURE (NATE)

NSSDC ID- 73-101A-09

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - N.W. SPENCER
OI - G.R. CARIGNAN

NASA-GSFC
U OF MICHIGAN

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURED THE KINETIC TEMPERATURE OF THE NEUTRAL ATMOSPHERE BY DETERMINING THE INSTANTANEOUS DENSITY OF MOLECULAR NITROGEN IN A SPHERICAL CHAMBER COUPLED TO THE ATMOSPHERE THROUGH A KNIFE-EDGED ORIFICE. ANALYSIS OF THE MEASURED MOLECULAR NITROGEN DENSITY VARIATION OVER A SPIN CYCLE WITH A KNOWLEDGE OF THE SATELLITE'S MOTION AND ORIENTATION LEAD TO A DETERMINATION OF THE AMBIENT TEMPERATURE, INDEPENDENT OF SCALE HEIGHT. A MEASUREMENT OF THE AMBIENT NITROGEN DENSITY WAS ALSO OBTAINED. AN ALTERNATE MEASUREMENT OF NEUTRAL TEMPERATURE WAS ALSO UNDERTAKEN, USING A BAFFLE INSERTED IN FRONT OF THE ORIFICE TO INTERCEPT A PORTION OF THE GAS PARTICLE STREAM ENTERING THE CHAMBER. WHEN THE SATELLITE WAS IN THE DESPUN MODE, THE BAFFLE WAS MADE TO OSCILLATE IN THE STEPWISE FASHION TO INTERRUPT THE PARTICLE STREAM SEEN BY THE ORIFICE CHAMBER. THESE CHAMBER DENSITY VARIATIONS WERE INTERPRETED TO YIELD THE NEUTRAL GAS KINETIC TEMPERATURE. A DUAL-FILAMENT ION SOURCE SAMPLED THE THERMALIZED MOLECULAR NITROGEN IN THE CHAMBER AND PRODUCED AN ION BEAM DENSITY PROPORTIONAL TO THE NITROGEN CHAMBER DENSITY. FROM THE SOURCE, THIS IONIZED NITROGEN BEAM WAS DIRECTED FROM A QUADRUPOLE ANALYZER, TUNED TO PASS THOSE PARTICLES WHOSE MASS-TO-CHARGE RATIO (M/E) IS 28, ON TO AN ELECTRON MULTIPLIER. THE OUTPUT PULSES WERE AMPLIFIED AND COUNTED IN A 16-BIT ACCUMULATOR. WHEN THE SATELLITE WAS IN THE SPINNING MODE, THE NITROGEN DENSITY WAS MEASURED ONCE PER SPIN PERIOD, NOMINALLY EVERY 15 S. THE NITROGEN KINETIC TEMPERATURE WAS MEASURED TWICE EACH SPIN PERIOD (WITHOUT THE BAFFLE OPERATING) AND ONCE PER SPIN PERIOD WITH BAFFLE OPERATION. WHEN THE SPACECRAFT WAS IN THE DESPUN MODE, THE NITROGEN DENSITY WAS MEASURED NEARLY CONTINUOUSLY, EXCEPT WHEN THE PARTICLE STREAM WAS INTERRUPTED BY THE BAFFLE. THE SENSOR WAS VACUUM-SEALED PRIOR TO LAUNCH AND OPENED TO THE ATMOSPHERE AFTER THE SPACECRAFT WAS IN ORBIT. MORE EXPERIMENT DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 287-296, APRIL 1973.

***** AE-E*****

SPACECRAFT COMMON NAME- AE-E

ALTERNATE NAMES- S 6E, ATMOSPHERE EXPLORER-E
EXPLORER 55, AE 5

NSSDC ID- 75-107A

LAUNCH DATE- 11/20/75

WEIGHT- 735. KG

LAUNCH SITE- CAPE CANAVERAL, UNITED STATES

LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 117.29 MIN
PERIAPSIS- 156. KM ALT

EPOCH DATE- 11/25/75
INCLINATION- 19.7 DEG
APOAPSIS- 2983. KM ALT

PERSONNEL

MG - F.W. GAETANO
SC - E.R. SCHMERLING
PM - J.P. CORRIGAN
PS - N.W. SPENCER

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE PURPOSE OF THE AE-E MISSION WAS TO INVESTIGATE THE CHEMICAL PROCESSES AND ENERGY TRANSFER MECHANISMS THAT CONTROL THE STRUCTURE AND BEHAVIOR OF THE EARTH'S ATMOSPHERE AND IONOSPHERE IN THE REGION OF HIGH ABSORPTION OF SOLAR ENERGY AT LOW AND EQUATORIAL LATITUDES. THE SIMULTANEOUS SAMPLING AT HIGHER LATITUDES WAS CARRIED OUT BY THE AE-D SPACECRAFT UNTIL ITS FAILURE ON 1/29/76 AND THEN BY AE-C. THE SAME TYPE OF SPACECRAFT AS AE-C WAS USED, AND THE PAYLOAD CONSISTED OF THE SAME TYPES OF INSTRUMENTS EXCEPT THAT THE LOW-ENERGY ELECTRON AND UV NITRIC OXIDE EXPERIMENTS WERE DELETED AND A BACKSCATTER UV SPECTROMETER WAS ADDED TO MONITOR THE OZONE CONTENT OF THE ATMOSPHERE. THE TWO EXPERIMENTS THAT WERE DELETED WERE MORE APPROPRIATE FOR THE HIGH LATITUDE REGIONS. THE PERIGEE SWEEP THROUGH MORE THAN SIX FULL LATITUDE CYCLES AND TWO LOCAL TIME CYCLES DURING THE FIRST YEAR AFTER LAUNCH WHEN THE ORBIT WAS ELLIPTICAL AND THE PERIGEE HEIGHT WAS VARIED BETWEEN 130 AND 400 KM. THE CIRCULARIZATION OF THE ORBIT AROUND 390 KM WAS MADE ON 11/20/76 AND, SIMILAR TO AE-C, WAS RAISED TO THIS HEIGHT WHENEVER IT WOULD DECAY TO ABOUT 250 KM.

----- AE-E, BRACE-----

INVESTIGATION NAME- CYLINDRICAL ELECTROSTATIC PROBE (CEP)

NSSDC ID- 75-107A-01

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
IONOSPHERES

ORIGINAL PAGE IS
OF POOR QUALITY

PERSONNEL

PI - L.H. BRACE
 O1 - R.F. THEIS
 O1 - A. DALGARNO

NASA-GSFC
 NASA-GSFC
 SAO

BRIEF DESCRIPTION

THE CEP CONSISTED OF TWO IDENTICAL INSTRUMENTS DESIGNED TO MEASURE ELECTRON TEMPERATURES, ELECTRON AND ION CONCENTRATIONS, ION MASS, AND SPACECRAFT POTENTIAL. ONE PROBE WAS ORIENTED ALONG THE SPIN AXIS OF THE SPACECRAFT (NORMALLY PERPENDICULAR TO THE ORBIT PLANE), AND THE OTHER RADIALLY SO THAT IT COULD OBSERVE IN THE DIRECTION OF THE VELOCITY VECTOR ONCE EACH 15-S SPIN PERIOD. EACH INSTRUMENT WAS A RETARDING POTENTIAL LANGMUIR PROBE DEVICE THAT PRODUCED A CURRENT-VOLTAGE (I-V) CURVE FOR A KNOWN VOLTAGE PATTERN PLACED ON THE COLLECTOR. ELECTROMETERS WERE USED TO MEASURE THE CURRENT. THERE WERE TWO SYSTEMS OF OPERATION (ONE WITH TWO MODES AND ANOTHER WITH THREE MODES) USING COLLECTOR VOLTAGE PATTERNS BETWEEN PLUS AND MINUS 5 VOLTS. MOST MODES INVOLVED AN AUTOMATIC OR FIXED ADJUSTMENT OF COLLECTOR VOLTAGE LIMITS (AND/OR ELECTROMETER OUTPUT) SUCH THAT THE REGION OF INTEREST ON THE I-V PROFILE PROVIDED HIGH RESOLUTION. EACH SYSTEM WAS DESIGNED FOR USE WITH ONLY ONE OF THE PROBES, BUT THEY COULD BE INTERSWITCHED TO PROVIDE BACKUP REDUNDANCY. THE BEST MEASUREMENTS IN THE MOST FAVORABLE MODES PROVIDED 1 S TIME RESOLUTION; ELECTRON TEMPERATURE BETWEEN 300 AND 1.0E4 DEG K (10 PERCENT ACCURACY); ION DENSITY BETWEEN 1.0E4 AND 1.0E7 PER CUBIC CM (10-20 PERCENT ACCURACY); ELECTRON DENSITY BETWEEN 50 AND 1.0E6 PER CUBIC CM; AND ION MASS AT ION DENSITIES ABOVE 1.0E4 PER CUBIC CM. EACH PROBE HAD A COLLECTOR ELECTRODE EXTENDING FROM THE CENTRAL AXIS OF A CYLINDRICAL GUARD RING. THE 2.5-CM-LONG GUARD RING WAS AT THE END OF A 25-CM BOOM, AND THE COLLECTOR EXTENDED ANOTHER 7.5 CM BEYOND THE GUARD RING. THE BOOM, GUARD, AND COLLECTOR WERE 0.2 CM IN DIA. MORE DETAILED INFORMATION CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 341-348, APRIL 1973.

----- AE-E, BRINTON-----

INVESTIGATION NAME- BENNETT ION-MASS SPECTROMETER (BIMS)

NSSDC ID- 75-107A-10

INVESTIGATIVE PROGRAM
 CODE ST

INVESTIGATION DISCIPLINE(S)
 IONOSPHERES
 PLANETARY ATMOSPHERES
 ATMOSPHERIC PHYSICS

PERSONNEL

PI - H.C. BRINTON
 O1 - M.W. PHARO, III
 O1 - H.A. TAYLOR, JR.

NASA-GSFC
 NASA-GSFC
 NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT WAS FLOWN TO MEASURE, THROUGHOUT THE ORBIT, THE INDIVIDUAL CONCENTRATIONS OF ALL THERMAL ION SPECIES IN THE MASS RANGE 1 TO 72 ATOMIC MASS UNITS (U) AND IN THE AMBIENT DENSITY RANGE FROM 5 IONS PER CUBIC CM TO 5.0E6 IONS PER CUBIC CM EACH. THE MASS RANGE IS NORMALLY SCANNED IN 1.6 S, BUT THE SCAN TIME PER RANGE CAN BE INCREASED BY COMMAND. LABORATORY AND IN-FLIGHT DETERMINATION OF SPECTROMETER EFFICIENCY AND MASS DISCRIMINATION PERMITTED DIRECT CONVERSION OF MEASURED ION CURRENTS TO AMBIENT CONCENTRATIONS. CORRELATION OF THESE MEASURED DATA WITH THE RESULTS FROM COMPARISON EXPERIMENTS, 'ELECTROSTATIC PROBE (75-107A-01)' AND 'RETARDING POTENTIAL ANALYZER (75-107A-04),' PERMITTED INDIVIDUAL ION CONCENTRATIONS TO BE DETERMINED WITH HIGH ACCURACY. THE EXPERIMENT'S FOUR PRIMARY MECHANICAL COMPONENTS WERE: GUARD RING AND ION-ANALYZER TUBE, COLLECTOR AND PREAMPLIFIER ASSEMBLY, VENT, AND MAIN ELECTRONICS HOUSING. A THREE-STAGE BENNETT TUBE WITH 7- TO 5-CYCLE DRIFT SPACES WAS FLOWN, AND HAS BEEN MODIFIED TO PERMIT ION CONCENTRATION MEASUREMENTS TO BE OBTAINED DOWN TO 120 KM ALTITUDE. SPECIFICALLY, A VENT WAS PROVIDED AT THE REAR OF THE SPECTROMETER, AND THE USUAL FLAT-DISK, ION-CURRENT COLLECTOR WAS REPLACED BY A STACK OF WIRE-MESH GRIDS. THE BALANCE BETWEEN ION-CURRENT SENSITIVITY AND MASS-RESOLUTION IN A BENNETT SPECTROMETER MAY BE ALTERED BY CHANGING APPROPRIATE VOLTAGES. THESE VOLTAGE CHANGES WERE CONTROLLED INDEPENDENTLY BY GROUND COMMAND FOR EACH ONE OF THE THREE MASS RANGES -- 1 TO 4, 2 TO 18, AND 8 TO 72. MORE COMPLETE EXPERIMENT DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 323-332, APRIL 1973.

----- AE-E, CHAMPION-----

INVESTIGATION NAME- ATMOSPHERIC DENSITY ACCELEROMETER (MESA)

NSSDC ID- 75-107A-02

INVESTIGATIVE PROGRAM
 CODE ST

INVESTIGATION DISCIPLINE(S)
 PLANETARY ATMOSPHERES
 IONOSPHERES

PERSONNEL

PI - K.S.W. CHAMPION
 O1 - F.A. MARCOS

USAF GEOPHYS LAB
 USAF GEOPHYS LAB

BRIEF DESCRIPTION

MESA (MINIATURE ELECTROSTATIC ANALYZER) OBTAINED DATA ON THE NEUTRAL DENSITY OF THE ATMOSPHERE IN THE ALTITUDE RANGE OF 120 KM TO 400 KM BY THE MEASUREMENTS OF SATELLITE DECELERATION DUE TO AERODYNAMIC DRAG. THE INSTRUMENT CONSISTED OF THREE SINGLE-AXIS ACCELEROMETERS, MOUNTED MUTUALLY AT RIGHT ANGLES, TWO IN THE SPACECRAFT X-Y PLANE AND THE OTHER ALONG THE Z-AXIS. THE INSTRUMENT DETERMINED THE APPLIED ACCELERATION FROM THE ELECTROSTATIC FORCE REQUIRED TO RECENTER A PROOF MASS. THE OUTPUT OF THE DEVICE WAS A DIGITAL PULSE RATE PROPORTIONAL TO THE APPLIED ACCELERATION. THE MEASUREMENTS ALLOWED DETERMINATION OF THE DENSITY OF THE NEUTRAL ATMOSPHERE, MONITORED THE THRUST OF THE ORBIT-ADJUST PROPULSION SYSTEM (OAPS), DETERMINED THE SATELLITE MINIMUM ALTITUDE, MEASURED SPACECRAFT ROLL, AND PROVIDED SOME ATTITUDE-SENSING INFORMATION. SPACECRAFT NUTATIONS OF LESS THAN 0.01 DEGREES WERE MONITORED. THE INSTRUMENT HAD THREE SENSITIVITY RANGES -- 8.E-3 EARTH'S GRAVITY (G) IN OAPS MONITOR MODE; 4.E-4 G BETWEEN 120 KM (PLUS OR MINUS 2 PERCENT) AND 280 KM (PLUS OR MINUS 10 PERCENT); AND 2.E-5 G BETWEEN 180 KM (PLUS OR MINUS 2 PERCENT) AND 400 KM (PLUS OR MINUS 10 PERCENT). NUMBERS IN PARENTHESES REPRESENT ERRORS; IN ADDITION, THERE MAY BE A SYSTEMATIC ERROR OF UP TO PLUS OR MINUS 5 PERCENT DUE TO DRAG COEFFICIENT UNCERTAINTY. THE HIGHEST ALTITUDE WAS DETERMINED ASSUMING THE INSTRUMENT COULD SENSE TO 0.2 PERCENT OF FULL SCALE.

----- AE-E, DOERING-----

INVESTIGATION NAME- PHOTOELECTRON SPECTROMETER (PES)

NSSDC ID- 75-107A-03

INVESTIGATIVE PROGRAM
 CODE ST

INVESTIGATION DISCIPLINE(S)
 IONOSPHERES
 PLANETARY ATMOSPHERES

PERSONNEL

PI - J.P. DOERING
 O1 - C.O. BOSTROM

JOHNS HOPKINS U
 APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO PROVIDE INFORMATION ON THE INTENSITY, ANGULAR DISTRIBUTION, ENERGY SPECTRUM, AND NET FLOW ALONG FIELD LINES, OF ELECTRONS IN THE THERMOSPHERE WITH ENERGIES BETWEEN 2 AND 500 EV. THE INSTRUMENT CONSISTED OF TWO IDENTICAL, OPPOSITELY DIRECTED, HEMISPHERICAL, ELECTROSTATIC ANALYZERS. EACH SPECTROMETER HAD A RELATIVE ENERGY RESOLUTION OF PLUS OR MINUS 2.5 PERCENT AND A GEOMETRIC FACTOR ON THE ORDER OF 0.001 SQ CM-SR, INDEPENDENT OF ELECTRON ENERGY. THREE SEPARATE ENERGY RANGES COULD BE -- 0 TO 25 EV, 0 TO 100 EV, OR 0 TO 500 EV. MEASUREMENTS FROM THESE INTERVALS COULD BE SEQUENCED IN 5 DIFFERENT WAYS. DATA COULD BE TAKEN FROM EITHER SENSOR SEPARATELY, OR ALTERNATELY WITH TIME RESOLUTION VARYING FROM 0.25 TO 8 S. THERE WERE TWO DEFLECTION VOLTAGE SCAN RATES DETERMINED BY SPACECRAFT CLOCK. THIS VOLTAGE WAS CHANGED IN 64 STEPS, AND WAS DONE AT 4 OR 16 STEPS PER TELEMETRY FRAME. WITH 16 FRAMES/S, THIS ALLOWED A CHOICE OF EITHER ONE 64-POINT SPECTRUM, OR FOUR 16-POINT SPECTRA IN ONE SECOND. THE LONGEST (8 S) CYCLE OF DATA INVOLVED OBSERVATIONS USING INCREASING VOLTAGE STEPS FOR THE LOWEST, MIDDLE, LOWEST, THEN HIGHEST ENERGY RANGES (IN THAT ORDER) FOR 1 S EACH. A REPEAT FOR DECREASING VOLTAGE STEP COMPLETED THE CYCLE. A MORE DETAILED DESCRIPTION OF THIS EXPERIMENT MAY BE FOUND IN 'RADIO SCIENCE,' 8, 4, 387-392, APRIL 1973.

----- AE-E, HANSON-----

INVESTIGATION NAME- RETARDING POTENTIAL ANALYZER/DRIFT METER (RPA)

NSSDC ID- 75-107A-04

INVESTIGATIVE PROGRAM
 CODE ST

INVESTIGATION DISCIPLINE(S)
 PLANETARY ATMOSPHERES
 IONOSPHERES

PERSONNEL

PI - W.B. HANSON
 O1 - D.R. ZUCCARO
 O1 - S. SANATANI
 O1 - C.R. LIPPENCOTT

U OF TEXAS, DALLAS
 U OF TEXAS, DALLAS
 U OF TEXAS, DALLAS
 U OF TEXAS, DALLAS

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO DETERMINE OBSERVATIONS OF VECTOR ION DRIFT VELOCITIES, ION CONCENTRATION AND TEMPERATURE, AND SPACECRAFT POTENTIAL. AN IONOSPHERIC IRREGULARITY INDEX WAS ALSO OBTAINED FROM THE ION CONCENTRATION SENSOR. THE EXPERIMENT CONSISTED OF A RETARDING POTENTIAL ANALYZER WITH FOUR PLANAR SENSOR HEADS. THE SENSOR HEAD USED FOR ION DRIFT MEASUREMENTS WAS CO-LOCATED WITH ANOTHER HEAD, AND ALL WERE SPACED NEARLY EQUALLY, LOOKING OUTWARD FROM THE SATELLITE EQUATOR. SINCE THE SATELLITE SPIN AXIS WAS PERPENDICULAR TO THE ORBIT PLANE, THESE HEADS COULD OBSERVE ALONG THE SPACECRAFT VELOCITY VECTOR IN EITHER THE SPIN OR DESPIN MODE OF THE SPACECRAFT. THE PRIMARY PURPOSE OF THIS EXPERIMENT WAS TO PROVIDE ACCURATE ION TEMPERATURES WITH OTHER MEASUREMENTS BEING OF SECONDARY IMPORTANCE. THREE OF THE SENSOR HEADS WERE SIMILAR. THEY HAD TWO GROUNDED ENTRANCE GRIDS, TWO RETARDING GRIDS, A SUPPRESSOR GRID, A SHIELD GRID, AND A COLLECTOR. A LINEAR SWEEP VOLTAGE (32 OR 22 TO 0 V, UP OR DOWN) WAS NORMALLY APPLIED TO THE RETARDING GRIDS IN 0.75 S. INTERPRETATION OF THE RESULTING CURRENT-VOLTAGE PROFILES PROVIDED THE ION

TEMPERATURE, THE ION AND ELECTRON CONCENTRATION, SOME ION COMPOSITION INFORMATION, VEHICLE POTENTIAL AND PLASMA DRIFT VELOCITY PARALLEL TO THE VELOCITY VECTOR. TWO OF THE THREE SIMILAR SENSORS HAD AN ADDITIONAL GRID BETWEEN THE ENTRANCE AND RETARDING GRIDS IN ORDER TO PROTECT INNER GRIDS FROM ION BOMBARDMENT DURING ELECTRON MEASUREMENTS. THE OTHER SIGNIFICANT FEATURE OF THESE TWO SENSORS WAS THAT A SMALL POSITIVE COLLECTOR BIAS COULD BE APPLIED TO ASSURE ADEQUATE ACCESS OF THERMAL ELECTRONS TO THE COLLECTOR. WITH THE RETARDING GRID AT CONSTANT ZERO VOLTS, CURRENT CHANGES COULD BE OBSERVED FOR 3-S PERIODS TO OBTAIN GRADIENTS OF ION CONCENTRATION. ELECTRON PARAMETERS WERE MEASURED IN A MANNER SIMILAR TO IONS EXCEPT FOR THE LINEAR SWEEP VOLTAGE (-3 OR -2 TO 0 V, UP OR DOWN) RANGE. IONS IN MASS RANGES 1 TO 4, 14 TO 16, 24 TO 32 AND GREATER THAN 40 U COULD BE IDENTIFIED. THE FOURTH SENSOR HEAD WAS FOR THE ION-DRIFT VELOCITY MEASUREMENTS, AND CONSISTED OF FOUR GROUNDED GRIDS, A NEGATIVELY BIASED SUPPRESSOR GRID, AND A FOUR-SEGMENT COLLECTOR. DIFFERENCES IN VARIOUS COLLECTOR SEGMENT CURRENTS PROVIDED ION-DRIFT DIRECTIONAL COMPONENT INFORMATION. MORE DETAILS OF THIS EXPERIMENT ARE AVAILABLE IN 'RADIO SCIENCE,' 8, 4, 333-339, APRIL 1973.

----- AE-E, HAYS-----

INVESTIGATION NAME- VISIBLE AIRGLOW PHOTOMETER (VAE)

NSSDC ID- 75-107A-11

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - P.B. HAYS	U OF MICHIGAN
OI - G.G. SHEPHERD	YORK U
OI - G.R. CARIGNAN	U OF MICHIGAN
OI - J.C.G. WALKER	ARECIBO OBSERVATORY

BRIEF DESCRIPTION

THIS EXPERIMENT PROVIDED DETAILED DATA ON THE RATES OF EXCITATION OF THE ATOMIC AND MOLECULAR CONSTITUENTS OF THE THERMOSPHERE. THE WAVELENGTH RANGE COVERED, EXPRESSED IN ANGSTROMS, WAS MEASURED IN PAIRS -- 7319 AND 6563, 5300 AND DARK, 5577 AND 7319, 2800 AND 5200, 6300 AND 5577, CALIB AND 2800, AND 6563 AND 6300. A PHOTOMETER WAS USED WHICH CONTAINED TWO SEPARATE OPTICAL CHANNELS, A NARROW FIELD OF VIEW AND A WIDE FIELD OF VIEW. SPECTRAL SELECTION WAS ACCOMPLISHED WITH A FILTER WHEEL THAT CONTAINED SIX INTERFERENCE FILTERS AND A DARK AND CALIBRATE POSITION. THE TWO CHANNELS WERE SEPARATED BY 90 DEG. ONE CHANNEL HAD A 3-DEG HALF-ANGLE CONE FIELD OF VIEW FOR HIGH SENSITIVITY AND POINTED NORMALLY TOWARD THE LOCAL ZENITH. THE SECOND HAD A FIELD OF VIEW OF 0.75-DEG HALF CONE FOR HIGH SPATIAL RESOLUTION POINTING TANGENT TO THE SURFACE OF THE EARTH WHEN THE SATELLITE WAS IN THE ORIENTED MODE. BOTH CHANNELS WERE PROTECTED FROM STRAY LIGHT CONTAMINATION DURING THE DAYTIME WITH MULTISTAGE Baffle SYSTEMS. FILTERS WERE OPERATED IN SEVERAL MODES. THE TWO SEPARATE OPTICAL CHANNELS WERE MONITORED AT TIME INTERVALS CONSISTENT WITH THEIR ANGULAR RESOLUTION IN THE SPINNING MODE. MORE EXPERIMENT DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 369-377, APRIL 1973.

----- AE-E, HEATH-----

INVESTIGATION NAME- BACKSCATTER UV SPECTROMETER (BUV)

NSSDC ID- 75-107A-16

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - D.F. HEATH	NASA-GSFC
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BRIEF DESCRIPTION

THE BACKSCATTER ULTRAVIOLET INSTRUMENT (BUV) MONITORED THE SPATIAL DISTRIBUTION OF ATMOSPHERIC OZONE BY MEASURING THE INTENSITY OF THE UV RADIATION BACKSCATTERED FROM THE EARTH'S ATMOSPHERE. TO OBTAIN THIS OZONE DISTRIBUTION, THE BUV SUBSYSTEM MEASURED DIRECT SOLAR RADIATION AND BACKSCATTERED UV RADIATION FROM THE DAYTIME SUN-ILLUMINATED ATMOSPHERE. THE EXPERIMENT CONSISTED OF A SPECTROMETER (MONOCHROMATOR) AND A PHOTOMETER. THE MONOCHROMATOR MEASURED THE INTENSITY OF UV RADIATION BACKSCATTER AND REFLECTED RADIATION FROM THE EARTH'S ATMOSPHERE IN 12 WAVELENGTHS (2555 A TO 3398 A) IN WHICH OZONE ATTENUATION OCCURS. THE PHOTOMETER MEASURED THE REFLECTED UV RADIATION IN A SINGLE WAVELENGTH SPAN IN WHICH ATTENUATION BY OZONE DOES NOT OCCUR. THE BUV HAD FOUR OPERATING MODES.

----- AE-E, HEDIN-----

INVESTIGATION NAME- NEUTRAL ATMOSPHERE COMPOSITION (NACE)

NSSDC ID- 75-107A-08

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
IONOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - A.E. HEDIN	NASA-GSFC
OI - C.A. REBER	NASA-GSFC
OI - G.R. CARIGNAN	U OF MICHIGAN

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURED IN SITU THE SPATIAL DISTRIBUTION AND TEMPORAL CHANGES OF THE CONCENTRATIONS OF THE NEUTRAL ATMOSPHERIC SPECIES. IN ADDITION, NEW INSIGHT INTO IN SITU MEASUREMENT TECHNIQUES WERE OBTAINED FROM COMPARISONS OF THESE MEASUREMENTS WITH THOSE OBTAINED FROM OTHER ONBOARD EXPERIMENTS, NAMELY, OPEN SOURCE SPECTROMETER (75-107A-07), SOLAR EUV SPECTROPHOTOMETER (75-107A-06), AND DENSITY-ACCELEROMETER (75-101A-02). THE MASS-SPECTROMETER SENSOR INCLUDED A GOLD-PLATED STAINLESS STEEL THERMALIZING CHAMBER AND ION SOURCE, A HYPERBOLIC ROD QUADRUPOLE ANALYZER, AND AN OFF-AXIS ELECTRON MULTIPLIER. WHEN OPERATING IN THE 'NORMAL' FORMAT, THE ANALYZER MEASURED ALL MASSES IN THE RANGE 1 TO 44 WITH EMPHASIS ON HYDROGEN, HELIUM, OXYGEN, NITROGEN, AND ARGON. ANOTHER FORMAT WAS OPTIMIZED FOR MINOR CONSTITUENT STUDIES OF GAS SPECIES IN THE MEASURED RANGE. SPATIAL RESOLUTION WAS DETERMINED PRIMARILY BY THE MODE OF SPACECRAFT OPERATION. IN ORBIT, THE PRESEALED SPECTROMETER WAS OPENED, AND THE ATMOSPHERIC CONSTITUENTS PASSED THROUGH A KNIFE-EDGED ORIFICE INTO THE THERMALIZATION CHAMBER AND ION SOURCE. SELECTED IONS LEFT THE QUADRUPOLE ANALYZER THROUGH A WEAK FOCUSING LENS AND WERE ACCELERATED INTO AN ELECTRON MULTIPLIER, WHERE THEY WERE TURNED 90 DEG TO STRIKE THE FIRST DYNODE. THE SPECTROMETER HAD A RESOLUTION OF BETTER THAN 1 U FOR ALL MASSES BETWEEN 1 AND 44, AND THE MEASUREMENT SYSTEM HAD A DYNAMIC RANGE OF APPROXIMATELY 1.E8. THERE WAS PROVISION FOR THE INSTRUMENT ORIFICE TO BE COVERED DURING SPACECRAFT THRUSTER OPERATIONS. MORE EXPERIMENT DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 277-285, APRIL 1973.

----- AE-E, HINTEREGGER-----

INVESTIGATION NAME- SOLAR EUV SPECTROPHOTOMETER (EUVS)

NSSDC ID- 75-107A-06

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
SOLAR PHYSICS

PERSONNEL

PI - H.E. HINTEREGGER	USAF GEOPHYS LAB
OI - D.E. BEDO	USAF GEOPHYS LAB
OI - L.A. HALL	USAF GEOPHYS LAB
OI - J.E. MANSON	USAF GEOPHYS LAB
OI - C.W. CHAGNON	USAF GEOPHYS LAB

BRIEF DESCRIPTION

EUVS WAS USED TO OBSERVE THE VARIATIONS IN THE SOLAR EUV FLUX IN THE WAVELENGTH RANGE FROM 140 TO 1850 A AND THE ATMOSPHERIC ATTENUATION AT VARIOUS FIXED WAVELENGTHS. THIS PROVIDED QUANTITATIVE ATMOSPHERIC STRUCTURE AND COMPOSITION DATA. THE INSTRUMENT CONSISTED OF 24 GRAZING-INCIDENCE GRATING MONOCHROMATORS, USING PARALLEL-SLIT SYSTEMS FOR ENTRANCE COLLIMATION AND PHOTOELECTRIC DETECTORS AT THE EXIT SLITS. TWELVE OF THESE MONOCHROMATORS HAD WAVELENGTH SCAN CAPABILITY, EACH WITH 128 SELECTABLE WAVELENGTH POSITIONS, WHICH COULD ALSO AUTOMATICALLY STEP SCAN THROUGH THESE POSITIONS. THE OTHER 12 MONOCHROMATORS OPERATED AT FIXED WAVELENGTHS WITH FIELDS OF VIEW SMALLER THAN THE FULL SOLAR DISK TO AID IN THE ATMOSPHERIC ABSORPTION ANALYSIS. THE SPECTRAL RESOLUTION VARIED FROM 2 TO 54 A DEPENDING UPON THE PARTICULAR INSTRUMENT. THE FIELD OF VIEW VARIED FROM 60 X 60 ARC MIN DOWN TO 3 X 6 ARC MIN. ALL 24 MONOCHROMATOR-ENTRANCE AXES WERE CO-ALIGNED PARALLEL. A SOLAR POINT SYSTEM COULD POINT TO 256 DIFFERENT POSITIONS, EXECUTE A 16-STEP ONE-DIMENSIONAL SCAN OR A FULL 256-STEP RASTER. THE TIME RESOLUTION VARIED FROM 0.5 S FOR OBSERVING 12 FIXED WAVELENGTHS UP TO 256 S FOR PROGRAMMING THE EUVS THROUGH ALL POSSIBLE MODES. MORE DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 349-360, APRIL 1973.

----- AE-E, NIER-----

INVESTIGATION NAME- OPEN-SOURCE NEUTRAL MASS SPECTROMETER (OSS)

NSSDC ID- 75-107A-07

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - A.O.C. NIER	U OF MINNESOTA
OI - W.E. POTTER	U OF MINNESOTA
OI - K. MAUERSBERGER	U OF MINNESOTA

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT WAS TO CONTRIBUTE TO A STUDY OF THE CHEMICAL, DYNAMIC, AND ENERGETIC PROCESSES THAT CONTROL THE STRUCTURE OF THE THERMOSPHERE BY PROVIDING DIRECT, IN SITU MEASUREMENTS OF BOTH MAJOR AND MINOR NEUTRAL ATMOSPHERIC CONSTITUENTS HAVING MASSES IN THE RANGE FROM 1 TO 48 ATOMIC MASS UNITS (U). A DOUBLE-FOCUSING, MATTACH-HERZOG MAGNETIC DEFLECTION MASS SPECTROMETER WITH AN IMPACT ION SOURCE WAS FLOWN. TWO ION COLLECTORS WERE INCLUDED TO MEASURE IONS

DIFFERING IN MASS BY A FACTOR OF 8; I.E., THE TWO MASS RANGES COVERED WERE 1 TO 8 U (AMU) AND 7 TO 48 U. IN THE ION SOURCE THE NEUTRAL SPECIES WAS IONIZED BY MEANS OF ELECTRON IMPACT. THE ELECTRON ENERGIES WERE SELECTABLE; 75 EV FOR THE HIGH EV MODE AND 25 EV FOR THE LOW EV MODE. AT ALTITUDES GREATER THAN 380 KM, ION CURRENTS WERE MEASURED WITH AN ELECTRON MULTIPLIER COUNTING INDIVIDUAL IONS. COUNTS WERE ACCUMULATED FOR 1/20 S BEFORE AUTOMATICALLY SWITCHING TO A DIFFERENT MASS NUMBER. WHILE COMPLETE MASS SPECTRA COULD BE SWEEPED, IN THE COMMON MODE OF OPERATION PEAK STEPPING WAS EMPLOYED, WITH READINGS ON THE PRINCIPAL PEAKS IN THE MASS SPECTRUM BEING REPEATED APPROXIMATELY EVERY 0.5 S AND OTHER SPECIES LESS FREQUENTLY. DATA BELOW 380 KM WERE MEASURED USING AN ELECTROMETER. IN ADDITION TO THE PEAK STEPPING MODE, THERE WERE SEVERAL OTHER OPERATING MODES WHICH WERE SELECTED BY GROUND COMMAND. AMBIENT PARTICLES STRIKING THE ION SOURCE RETAIN ENERGIES LESS THAN 0.1 EV, WHICH IS NOT HIGH ENOUGH TO OVERCOME THE NEGATIVE SPACE CHARGE POTENTIAL HOLDING THE IONS IN THE BEAM. THOSE AMBIENT PARTICLES THAT DID NOT STRIKE THE ION SOURCE RETAINED THEIR INCOMING ENERGY OF SEVERAL EV AFTER IONIZATION AND ESCAPE INTO THE ACCELERATING REGION OF THE ANALYZER. MORE EXPERIMENT DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 271-276, APRIL 1973.

----- AE-E, RICE-----

INVESTIGATION NAME- CAPACITANCE MANOMETER

NSSDC ID- 75-107A-12

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - C.J. RICE

AEROSPACE CORP

BRIEF DESCRIPTION

THE CAPACITANCE MANOMETER FLOWN ON AE-E WAS PRIMARILY AN ENGINEERING EXPERIMENT TO PROVIDE DATA ON SPACECRAFT OPERATION. HOWEVER, DATA FROM THIS EXPERIMENT WERE ALSO CORRELATED WITH ACCELEROMETER AND ION GAUGE DATA IN EVALUATING SATELLITE DRAG. THE MANOMETER, ALSO REFERRED TO AS PRESSURE SENSOR B (PSB), PROVIDED A DIRECT MEASURE OF ATMOSPHERIC PRESSURE IN THE REGION BELOW 200 KM. THE ACCURACY OF THE PSB GAUGE VARIED FROM ABOUT 10 PERCENT AT 120 KM TO ABOUT 40 PERCENT AT 180 KM. THE PSB CONSISTED OF TWO SPHERICAL, THERMALLY CONTROLLED CHAMBERS, SEPARATED BY A THIN MEMBRANE STRETCHED FLAT AND UNDER RADIAL TENSION. ANY DEFLECTION OF THE DIAPHRAGM CAUSED BY A PRESSURE DIFFERENTIAL BETWEEN THE TWO SIDES CAUSED A CHANGE IN CAPACITANCE BETWEEN THE DIAPHRAGM AND AN ADJACENT ELECTRODE WHICH BIASED AN AC BRIDGE CIRCUIT. AIR WAS ALLOWED INTO ONE OF THE CHAMBERS THROUGH TWO PORTS 180 DEG APART AND PERPENDICULAR TO THE SPACECRAFT SPIN AXIS. THUS THE WAKE-RAM PRESSURE DIFFERENTIAL WAS SAMPLED TWICE EACH SPACECRAFT REVOLUTION.

----- AE-E, RICE-----

INVESTIGATION NAME- COLD CATHODE ION GAUGE

NSSDC ID- 75-107A-13

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - C.J. RICE

AEROSPACE CORP

BRIEF DESCRIPTION

THE COLD CATHODE-ION GAUGE WAS PRIMARILY AN ENGINEERING EXPERIMENT TO PROVIDE DATA ON SPACECRAFT OPERATION. HOWEVER, DATA FROM THIS EXPERIMENT WAS CORRELATED WITH ACCELEROMETER AND CAPACITANCE MANOMETER DATA TO EVALUATE SATELLITE DRAG PERFORMANCE. THE ION GAUGE, ALSO REFERRED TO AS PRESSURE SENSOR A (PSA), MEASURED ATMOSPHERIC PRESSURE IN THE REGION BETWEEN 120 TO 370 KM ABOVE THE EARTH'S SURFACE FOR VALUES OF ATMOSPHERIC PRESSURE BETWEEN 1.3×10^{-3} TO 1.3×10^{-7} MB. THE ESTIMATED ACCURACY OF THE PSA WAS PLUS OR MINUS 20 PERCENT. THE CYLINDRICALLY-SHAPED SENSOR PACKAGE CONSISTED OF A WEDGE-SHAPED ORIFICE, A CATHODE NEAR GROUND POTENTIAL, AN ANODE OPERATING AT ABOUT 1300 VDC, AND A PERMANENT MAGNETIC FIELD OF ABOUT 0.16T (1600 GAUSS). THE GAUGE CONTAINED NO PRIMARY SOURCE OF IONIZING ELECTRONS. THE DISCHARGE WAS INITIATED BY FIELD EMISSION AND WAS SELF-SUSTAINING AT A PRESSURE ABOVE 1.3×10^{-7} MB. THE ION CURRENT WAS COLLECTED AT THE CATHODE. THE SENSOR WAS MOUNTED ON THE SPACECRAFT, WITH THE ORIFICE PERPENDICULAR TO THE SPACECRAFT SPIN AXIS, WHICH WAS NORMAL TO THE ORBITAL PLANE. THE INSTRUMENT WAS OPERATED IN TWO MODES, SPINNING AND DESPUN. WHEN THE SPACECRAFT WAS IN A SPINNING MODE, THE PSA ALTERNATELY SAMPLED THE RAM AND WAKE PRESSURE. WHEN THE SPACECRAFT WAS IN THE DESPUN MODE, THE PSA FACED 30 DEG FROM THE DIRECTION OF MOTION. DATA FROM THIS EXPERIMENT WERE NOT TAPE RECORDED, BUT OBSERVED IN REAL TIME.

----- AE-E, SPENCER-----

INVESTIGATION NAME- NEUTRAL ATMOSPHERE TEMPERATURE (NATE)

NSSDC ID- 75-107A-09

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - N.W. SPENCER
OI - G.R. CARRIGAN
OI - H.B. NIEMANN

NASA-GSFC
U OF MICHIGAN
NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO MEASURE THE KINETIC TEMPERATURE OF THE NEUTRAL ATMOSPHERE BY DETERMINING THE INSTANTANEOUS DENSITY OF MOLECULAR NITROGEN IN A SPHERICAL CHAMBER COUPLED TO THE ATMOSPHERE THROUGH A KNIFE-EDGED ORIFICE. ANALYSIS OF THE MEASURED MOLECULAR NITROGEN DENSITY VARIATION OVER A SPIN CYCLE WITH A KNOWLEDGE OF THE SATELLITE'S MOTION AND ORIENTATION LED TO A DETERMINATION OF THE AMBIENT TEMPERATURE, INDEPENDENT OF SCALE HEIGHT. A MEASUREMENT OF THE AMBIENT NITROGEN DENSITY AND NEUTRAL WIND WERE ALSO OBTAINED. AN ALTERNATE MEASUREMENT OF NEUTRAL TEMPERATURE WAS ALSO UNDERTAKEN, USING A BAFFLE INSERTED IN FRONT OF THE ORIFICE TO INTERCEPT A PORTION OF THE GAS PARTICLE STREAM ENTERING THE CHAMBER. WHEN THE SATELLITE WAS IN THE DESPUN MODE, THE BAFFLE WAS MADE TO OSCILLATE IN A STEPWISE FASHION IN ORDER TO INTERRUPT THE PARTICLE STREAM SEEN BY THE ORIFICE CHAMBER. THESE CHAMBER DENSITY VARIATIONS WERE INTERPRETED TO YIELD THE NEUTRAL GAS KINETIC TEMPERATURE ALSO. A DUAL-FILAMENT ION SOURCE SAMPLED THE THERMALIZED MOLECULAR NITROGEN IN THE CHAMBER AND PRODUCED AN ION BEAM DENSITY PROPORTIONAL TO THE NITROGEN CHAMBER DENSITY. FROM THE SOURCE, THIS IONIZED NITROGEN BEAM WAS DIRECTED INTO A QUADRUPOLE ANALYZER, TUNED TO PASS THOSE PARTICLES WHOSE MASS-TO-CHARGE RATIO (M/E) IS 28, AND ON TO AN ELECTRON MULTIPLIER. THE OUTPUT PULSES WERE AMPLIFIED AND COUNTED. THE SENSOR WAS VACUUM-SEALED PRIOR TO LAUNCH AND OPENED TO THE ATMOSPHERE AFTER THE SPACECRAFT WAS IN ORBIT. MORE EXPERIMENT DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 287-296, APRIL 1973.

***** ATS 6*****

SPACECRAFT COMMON NAME- ATS 6
ALTERNATE NAMES- PL-721A, ATS-F
7318

NSSDC ID- 74-039A

LAUNCH DATE- 05/30/74 WEIGHT- 930. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 05/31/74
ORBIT PERIOD- 1436.3 MIN INCLINATION- 1.8 DEG
PERIAPSIS- 35763.0 KM ALT APOAPSIS- 35818.0 KM ALT

PERSONNEL

MG - W.M. LEW, JR.
SC - NONE ASSIGNED
PM - C.M. MACKENZIE
PS - E.A. WOLFF

NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE PRIMARY OBJECTIVES OF ATS 6 (APPLICATIONS TECHNOLOGY SATELLITE) WERE TO ERCT IN ORBIT A LARGE HIGH-GAIN STEERABLE ANTENNA STRUCTURE CAPABLE OF PROVIDING A GOOD QUALITY TV SIGNAL TO A GROUND-BASED RECEIVER AND TO MEASURE AND EVALUATE THE PERFORMANCE OF SUCH AN ANTENNA. A SECONDARY OBJECTIVE WAS TO DEMONSTRATE NEW CONCEPTS ON SPACE TECHNOLOGY IN THE AREAS OF AIRCRAFT CONTROL, LASER COMMUNICATIONS, AND VISUAL AND INFRARED MAPPING OF THE EARTH/ATMOSPHERE SYSTEM. THE SPACECRAFT WAS ALSO CAPABLE OF -- (1) MEASURING RADIO FREQUENCY INTERFERENCE IN SHARED FREQUENCY BANDS AND PROPAGATION CHARACTERISTICS OF MILLIMETER WAVES, (2) PERFORMING SPACECRAFT-TO-SPACECRAFT COMMUNICATION AND TRACKING EXPERIMENTS, AND (3) MAKING PARTICLE AND RADIATION MEASUREMENTS OF THE GEOSYNCHRONOUS ENVIRONMENT. CONFIGURED SOMEWHAT LIKE AN OPEN PARASOL, THE ATS 6 SPACECRAFT CONSISTED OF FOUR MAJOR ASSEMBLIES -- (1) A 9.15-M-DIAM DISH ANTENNA, (2) TWO SOLAR CELL PADDLES MOUNTED AT RIGHT ANGLES TO EACH OTHER ON OPPOSITE SIDES OF AN UPPER EQUIPMENT MODULE, (3) AN EARTH-VIEWING EQUIPMENT MODULE (EVM) CONNECTED BY A TUBULAR MAST TO THE UPPER EQUIPMENT MODULE, AND (4) AN ATTITUDE CONTROL AND STABILIZATION SYSTEM. THE EVM, IN ADDITION TO HOUSING THE EARTH-VIEWING EXPERIMENTS, PROVIDED SUPPORT FOR THE PROPULSION SYSTEM AND TANKS, BATTERIES, A MULTIFREQUENCY TRANSPONDER, AND THE TELEMETRY, COMMAND, AND THERMAL CONTROL SYSTEMS. THE UPPER EQUIPMENT MODULE PROVIDED A PLATFORM FOR THE SPACE-VIEWING EXPERIMENTS. INERTIA WHEELS WERE THE PRIME MEANS FOR TORQUING THE SPACECRAFT, WITH BOTH HYDRAZINE AND AMMONIA MULTIJET THRUSTER SYSTEMS INCLUDED TO PROVIDE THE NECESSARY TORQUES FOR UNLOADING THE WHEELS. ALSO INCLUDED WAS A SMALL ENVIRONMENT MEASUREMENT PACKAGE CONTAINING A MAGNETOMETER AND SEVERAL PARTICLE EXPERIMENTS. FOR DETAILED DESCRIPTIONS OF THE SPACECRAFT AND OF THE INDIVIDUAL EXPERIMENTS, SEE THE JOURNAL IEEE TRANSACTIONS ON AEROSPACE AND ELECTRONIC SUBSYSTEMS, VOL. AES-11, NO. 6, NOV. 1975.

----- ATS 6, ARNOLDY-----

INVESTIGATION NAME- LOW-ENERGY PROTON/ELECTRON EXPERIMENT

NSSDC ID- 74-039A-03

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - R.L. ARNOLDY

U OF NEW HAMPSHIRE

BRIEF DESCRIPTION

THIS INVESTIGATION WAS DESIGNED TO MONITOR SPECTRA AND PITCH ANGLE DISTRIBUTIONS OF BOTH ELECTRONS AND PROTONS FROM 0 TO 22 KEV. ELECTRON AND PROTON DATA FROM THE SAME DIRECTION WERE OBTAINED SIMULTANEOUSLY USING FOUR DOUBLE 90-DEG CYLINDRICAL ELECTROSTATIC ANALYZERS AND EIGHT BENDIX-CHANNEL ELECTRON MULTIPLIERS. SWEEP MODE DETECTORS VIEWED PITCH ANGLES OF 0 AND 90 DEG, WHILE THE PITCH MODE DETECTORS VIEWED 45- AND 165-DEG PITCH ANGLES. THE FOUR PITCH MODE DETECTORS STEPPED THROUGH EIGHT ENERGY LEVELS AT ONE LEVEL/S. THE 4 SWEEP MODE DETECTORS SWEEPED FROM APPROXIMATELY 16 KEV TO 0 ENERGY ONCE PER SECOND, AND COULD BE COMMANDED TO DWELL AT ANY OF 16 LEVELS UP TO APPROXIMATELY 22 KEV. THE SWEEP MODE DETECTORS HAD TWO HIGH SPEED ACCUMULATORS THAT READ OUT EIGHT TIMES/FRAME, AND TWO ACCUMULATORS THAT READ OUT ONCE/FRAME. FOUR PERMUTATIONS OF DETECTORS WITH ACCUMULATORS WERE POSSIBLE BY COMMAND. WHEN THE DETECTORS WERE SWEEPING, THE SLOW ACCUMULATORS PROVIDED DATA INTEGRATED OVER THE SPECTRUM. BACKGROUND COUNT RATES WERE OBTAINED FOR 8 S APPROXIMATELY EVERY 94 MIN BY APPLICATION OF APPROXIMATELY 10 V OF CONSTANT REVERSE POLARITY ON THE ELECTROSTATIC ANALYZERS. GAIN LEVEL STABILITY OF THE CHANNEL ELECTRON MULTIPLIERS COULD BE CHECKED BY COMMAND TO LOWER THE PREAMPLIFIER THRESHOLD DISCRIMINATOR SETTINGS. FOR FURTHER DETAILS, SEE IEEE TRANS AEROSPACE AND ELECTRONIC SYSTEMS, AES-11, 1155-1157, 1975.

----- ATS 6, DAVIES-----

INVESTIGATION NAME- RADIO BEACON

NSSDC ID- 74-039A-09

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - K. DAVIES
OI - R.B. FRITZ
OI - R.N. GRUBB

NOAA-ERL
NOAA-ERL
NOAA-ERL

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT WAS TO STUDY VARIATIONS OF IONOSPHERIC PARAMETERS (TOTAL ELECTRON CONTENT, SCINTILLATION, IRREGULARITIES, AND ABSORPTION) WITH TIME AND SOLAR AND MAGNETIC ACTIVITY, AND TO STUDY THE RELATION OF THESE VARIATIONS TO IONOSPHERIC PROCESSES. THE RADIO BEACON EXPERIMENT PROVIDED THREE COHERENT CARRIER FREQUENCIES (40.0160 MHZ, 140.056 MHZ AND 360.1440 MHZ) FOR INVESTIGATION OF PARTICLES AFFECTING RADIO PROPAGATION. THE BEACON WAS DESIGNED FOR SEVERAL TYPES OF MEASUREMENTS, PRINCIPALLY FARADAY ROTATION, DIFFERENTIAL PHASE (DOPPLER), PHASE AND AMPLITUDE SCINTILLATION, AND SIGNAL AMPLITUDE (ABSORPTION). THE 40-MHZ CARRIER WAS AMPLITUDE STABILIZED TO ENABLE ACCURATE ABSORPTION MEASUREMENTS TO BE MADE. DIFFERENTIAL FARADAY MEASUREMENTS WERE POSSIBLE WITH CARRIERS AND SIDEBANDS. THE MODE OF OPERATION CALLED FOR CONTINUOUS EMISSION ON ALL FREQUENCIES. RESEARCH ORGANIZATIONS FROM A NUMBER OF COUNTRIES CONDUCTED STUDIES OF THE RADIO BEACON USING GROUND RECEIVERS BASED ON A UNIT DESIGNED BY THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION. GROUND STATIONS RANGING FROM COMPUTER-CONTROLLED UNITS TO SIMPLE MANUAL UNITS WERE LOCATED AT POINTS IN NORTH AND SOUTH AMERICA, EUROPE, THE MIDDLE EAST, INDIA, AND AFRICA. MANY OF THE UNITS WERE MOBILE AND MOVED FROM CONTINENT TO CONTINENT TO KEEP THE SPACECRAFT IN SIGHT WHEN ITS ORBIT SHIFTED ALONG THE EQUATOR.

----- ATS 6, DUNKERLY-----

INVESTIGATION NAME- SOLAR CELL RADIATION DAMAGE

NSSDC ID- 74-039A-16

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
COMMUNICATIONS

PERSONNEL

PI - W. DUNKERLY

HUGHES AIRCRAFT CO

BRIEF DESCRIPTION

THIS EXPERIMENT WAS FLOWN TO ISOLATE THE PREDOMINANT DEGRADATION MECHANISM(S) ASSOCIATED WITH PRESENTLY USED SOLAR CELLS, AND TO ELIMINATE ANOMALOUS DATA THROUGH INCREASED DATA POINTS AND IMPROVED INSTRUMENTATION ACCURACY. A TOTAL OF 80 SOLAR CELLS WERE INDIVIDUALLY MONITORED ON THE FLIGHT EXPERIMENT. TWELVE CURRENT-VOLTAGE POINTS AND TEMPERATURE DATA FOR EACH SOLAR CELL WERE TRANSMITTED TO GROUND ON A REAL-TIME BASIS. FIVE SOLAR CELLS OF 16 TYPES WERE INCLUDED TO PROVIDE A STATISTICALLY MEANINGFUL SAMPLE SIZE. A SOLAR ASPECT SENSOR INSURED THAT THE SUN WAS NORMAL TO THE TEST CELLS AT THE TIME

OF THE MEASUREMENTS.

----- ATS 6, FRITZ-----

INVESTIGATION NAME- MEASUREMENT OF LOW-ENERGY PROTONS

NSSDC ID- 74-039A-01

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - J.A. FRITZ
OI - A. KONRADI
OI - D.J. WILLIAMS

NOAA-ERL
NASA-JSC
NOAA-ERL

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF FOUR 2-ELEMENT SOLID-STATE TELESCOPES, MOUNTED IN A PLANE SUCH THAT TWO (A AND H) LOOKED RADIALLY AWAY FROM THE EARTH. THE THIRD TELESCOPE (B) WAS AT 90 DEG RELATIVE TO A AND H AND LOOKED 13 DEG EAST OF SOUTH, AND THE FOURTH TELESCOPE (C) LOOKED NORTHWARD, 45 DEG FROM A AND H. TELESCOPES A, B, AND C HAD GEOMETRIC FACTORS (G.F.) 6.6E-4 THROUGH 7.E-4 SQ CM-SR, AND TELESCOPE H HAD A 1.E-3 SQ CM-SR G.F. THE APERTURE OF EACH TELESCOPE DERIVED A CONICAL OPENING OF 11 DEG FULL ANGLE. ONCE EVERY 4 S, TELESCOPES A, B, AND C EACH MEASURED PROTON FLUXES IN SIX CONTIGUOUS, LOGARITHMICALLY EQUAL ENERGY CHANNELS BETWEEN 25.5 AND 234 KEV AND, ONCE EVERY 16 S, .234 TO 2.8-MEV PROTON FLUXES. THESE MODES HAD NO ELECTRON OR HIGHER ENERGY PROTON BACKGROUND. FROM THE H TELESCOPE, DE/DX VS E FLUXES OF 1.2 TO 1.8 AND 1.8 TO 3.6 MEV ALPHA PARTICLES AND OF HEAVIER PARTICLES IN THE Z RANGES 3 THROUGH 6 AND 6 THROUGH 8 WERE OBTAINED ONCE EACH 128 S. IN ADDITION, FIVE FLUXES WERE DETERMINED FROM OUTPUT OF THE FIRST H SENSOR ONLY, BUT AT FIVE DISCRIMINATION LEVELS. THESE CORRESPONDED MAINLY TO ALPHA PARTICLES IN THE .5 TO .8 AND .8 TO 2.7 MEV RANGES AND HEAVIER PARTICLES WITH Z VALUES GREATER THAN 2, 5, AND 8. PROTON FLUXES IN SEVEN ADDITIONAL CHANNELS BETWEEN .362 AND 1.1 MEV WERE ALSO DETERMINED ONCE EACH 5.3 S BY USE OF APPROPRIATE H-TELESCOPE DISCRIMINATION LEVELS. FOR FURTHER DETAILS, SEE FRITZ AND CESSNA, IEEE TRANS, AES-11, 1145, 1975.

----- ATS 6, GALICINAO-----

INVESTIGATION NAME- TRACKING AND DATA RELAY

NSSDC ID- 74-039A-18

INVESTIGATIVE PROGRAM
CODE EC

INVESTIGATION DISCIPLINE(S)
COMMUNICATIONS

PERSONNEL

PI - I.Y. GALICINAO

NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT PROVIDED EXPERIENCE AND INFORMATION USED IN DESIGNING TRACKING AND DATA RELAY SYSTEMS. THE SPECIFIC OBJECTIVES WERE TO -- (1) ESTABLISH THE ORBIT OF A LOW-ORBITING SPACECRAFT FROM A HIGHER ORBITING SPACECRAFT, AND (2) DEMONSTRATE THE TECHNOLOGY OF COMMAND AND TELEMETRY DATA TRANSMISSION BETWEEN A LOW-ALTITUDE SATELLITE AND A GROUND STATION USING A GEOSYNCHRONOUS SATELLITE AS A COMMUNICATIONS RELAY. THIS EXPERIMENT USED THE ATS 6 AS A REPEATER FOR INFORMATION TRANSMISSION BETWEEN EARTH AND A SECOND SATELLITE, SUCH AS NIMBUS. IT WAS A DUPLEX LINK THAT REQUIRED THE TRANSPONDER TO TRANSMIT AND RECEIVE, ON TWO CHANNELS SIMULTANEOUSLY. SEVERAL SATELLITE-TO-SATELLITE EXPERIMENTS WERE PLANNED USING ATS 6, WHICH WAS IN A GEOSYNCHRONOUS EQUATORIAL ORBIT, AND THE GEODETIC EARTH ORBITING SATELLITE-C (GEOS 3), WHICH IS IN A NEAR-EARTH, NEAR-CIRCULAR ORBIT.

----- ATS 6, GALICINAO-----

INVESTIGATION NAME- POSITION, LOCATION AND AIRCRAFT COMMUNICATION

NSSDC ID- 74-039A-19

INVESTIGATIVE PROGRAM
CODE EC

INVESTIGATION DISCIPLINE(S)
COMMUNICATIONS

PERSONNEL

PI - I.Y. GALICINAO
OI - A.F. GHAI

NASA-GSFC
COMSAT

BRIEF DESCRIPTION

THE POSITION LOCATION AND AIRCRAFT COMMUNICATION EXPERIMENT (PLACE) WAS USED TO DETERMINE THE OPERATIONAL FEASIBILITY OF AIR TRAFFIC CONTROL AND MARITIME SATELLITE SYSTEMS OPERATING IN THE AERONAUTICAL L-BAND. THE FIRST OBJECTIVE WAS TO PROVE THE FEASIBILITY OF TWO-WAY COMMUNICATIONS RELAYED BY SATELLITE BETWEEN GROUND TERMINALS AND AIRCRAFT OR SHIPS, INCLUDING -- (1) THE USE OF ATS 6 AS A SYNCHRONOUS SATELLITE FOR RELAYING COMMUNICATIONS, (2) THE USE OF THE AERONAUTICAL L-BAND FOR SATELLITE/AIRCRAFT AND SATELLITE/SHIP LINKS, (3) THE USE OF BOTH VOICE AND DIGITAL TWO-WAY COMMUNICATION, AND (4) THE USE OF A SATELLITE FOR AIRCRAFT/GROUND AND SHIP/SHORE MULTIPLE ACCESS COMMUNICATIONS. THE SECOND OBJECTIVE WAS TO INVESTIGATE THE FEASIBILITY AND TO EVALUATE THE ABSOLUTE AND RELATIVE ACCURACIES OF SEVERAL

POSITION LOCATION TECHNIQUES USING SATELLITES. THESE TECHNIQUES RELAYED VARIOUS SIGNALS FROM THE AIRCRAFT OR SHIP VIA THE SATELLITE TO THE CONTROL CENTER FOR DATA PROCESSING AND POSITION DETERMINATION.

----- ATS 6, KAMPINSKY-----

INVESTIGATION NAME- R.F. INTERFEROMETER SUBSYSTEM

NSSDC ID- 74-039A-29 INVESTIGATIVE PROGRAM
CODE EC

INVESTIGATION DISCIPLINE(S)
COMMUNICATIONS

PERSONNEL
PI - A. KAMPINSKY NASA-GSFC

BRIEF DESCRIPTION

THE RADIO FREQUENCY INTERFEROMETER (RFI), WHEN USED IN CONJUNCTION WITH TWO GROUND TRANSMITTERS, PROVIDES THE MEANS OF DETERMINING SPACECRAFT ATTITUDE IN ROLL, PITCH, AND COMPUTED YAW TO AN ACCURACY OF PLUS OR MINUS 0.018 DEG. WITHIN A 12.5-DEG CONICAL FOV AND TO PLUS OR MINUS 0.025 DEG WITHIN A 30-DEG CONICAL FOV CENTERED ON THE SPACECRAFT Z-AXIS. THE INTERFEROMETER CONTAINED -- (1) AN ANTENNA ARRAY, WHICH CONSISTED OF TWO ORTHOGONAL BASELINES WAS MOUNTED ON THE EARTH-VIEWING SURFACE OF THE EARTH-VIEWING MODULE, (2) A TWO-CHANNEL RECEIVER, ONE FOR REFERENCE SIGNAL AND ONE FOR COMPARISON SIGNAL, (3) A SPACECRAFT DATA CONVERTER, WHICH MEASURED THE PHASE RELATIONSHIP OF THE RECEIVER OUTPUT SIGNALS WITH RESPECT TO A COHERENT REFERENCE SIGNAL, AND WHICH CONVERTED THESE MEASUREMENTS TO DIGITAL FORM WHICH CAN BE TELEMETERED TO GROUND OR CONNECTED TO THE ATTITUDE CONTROL SYSTEM (A COMPLETE MEASUREMENT CAN BE MADE EVERY 230 MS AND TELEMETERED ONCE EVERY 3 S), AND (4) AN INTERFEROMETER HIGH-SPEED DATA LINK, WHICH WAS THE RESULTANT OUTPUT OF THE DIGITAL CONVERTER PHASE-COUNT GATE AND A 4-MHZ OSCILLATOR.

----- ATS 6, MASLEY-----

INVESTIGATION NAME- SOLAR COSMIC RAYS AND GEOMAGNETICALLY TRAPPED RADIATION

NSSDC ID- 74-039A-06 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - A.J. MASLEY TRW SYSTEMS GROUP
OI - P.R. SATTERBLOM MCDONNELL-DOUGLAS CORP

BRIEF DESCRIPTION

TWO SOLID-STATE TELESCOPES, ONE DIRECTED PERPENDICULAR TO AND THE OTHER DIRECTED PARALLEL TO THE LOCAL MAGNETIC FIELD DIRECTION. EACH MEASURED PROTONS FROM 0.2 TO 300 MEV IN 12 ENERGY INTERVALS AND ALPHA PARTICLES FROM 1.2 TO 180 MEV IN 10 ENERGY INTERVALS. TWO MAGNETIC ELECTRON SPECTROMETERS, ORIENTED PARALLEL TO THE TWO TELESCOPES, MEASURED ELECTRONS FROM 50 TO 800 KEV IN FOUR ENERGY INTERVALS.

----- ATS 6, MILLER-----

INVESTIGATION NAME- TELEVISION RELAY USING SMALL TERMINALS

NSSDC ID- 74-039A-28 INVESTIGATIVE PROGRAM
CODE EC

INVESTIGATION DISCIPLINE(S)
COMMUNICATIONS

PERSONNEL
PI - J.E. MILLER NASA-GSFC

BRIEF DESCRIPTION

THE PURPOSE OF THE TELEVISION RELAY USING SMALL TERMINALS (TRUST) EXPERIMENT WAS TO ADVANCE AND PROMOTE THE TECHNOLOGY OF WIDE-BAND SATELLITE COMMUNICATIONS TO SMALL GROUND TERMINALS, BY DEVELOPING AND DEMONSTRATING A PILOT SYSTEM USING THE ATS 6 SPACECRAFT WITH ITS HIGH-GAIN PARABOLIC REFLECTOR. SPECIFIC GOALS WERE -- (1) TO TEST AND EVALUATE AN EXPERIMENTAL SYSTEM FOR FM RELAY OF BLACK AND WHITE AND COLOR TV SIGNALS (AND ASSOCIATED SOUND) BETWEEN THE ATS 6 SPACECRAFT AND A UHF RECEIVING FACILITY, (2) TO EVALUATE THE PERFORMANCE OF THE PILOT SYSTEM RELATIVE TO EXPERIMENT DESIGN OBJECTIVES AND INTERNATIONALLY RECOGNIZED AND ACCEPTED STANDARDS FOR TV-TRANSMISSION SYSTEMS, (3) TO OBSERVE THE EFFECTS OF IONOSPHERIC DISPERSION ON SYSTEM PERFORMANCE AS A FUNCTION OF ELECTRON DENSITY, GROUND STATION LOCATION, OTHER SYSTEM VARIABLES, AND COMPARE WITH THEORETICAL PREDICTIONS, AND (4) TO PROVIDE INTERESTED UNDERDEVELOPED COUNTRIES AN OPPORTUNITY TO PARTICIPATE IN TESTS AND DEMONSTRATIONS OF A HIGH EFFECTIVE ISOTROPIC RADIATIVE POWER (EIRP) SATELLITE SUITABLE FOR NATIONAL EDUCATION TV USING INEXPENSIVE RECEIVERS. THE BASIC EXPERIMENT SYSTEM CONSISTED OF A HIGH-POWER MICROWAVE TRANSMITTING TERMINAL FOR EARTH-TO-SATELLITE COMMUNICATIONS, THE SPACECRAFT WITH A MICROWAVE-TO-UHF COMMUNICATIONS REPEATER, AND A PILOT MOBILE UHF GROUND RECEIVING FACILITY.

----- ATS 6, PAULIKAS-----

INVESTIGATION NAME- OMNIDIRECTIONAL SPECTROMETER

NSSDC ID- 74-039A-07 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - G.A. PAULIKAS AEROSPACE CORP
OI - J.B. BLAKE AEROSPACE CORP

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF FOUR SOLID-STATE INSTRUMENTS. ONE OF THESE WAS A TWO-ELEMENT TELESCOPE WITH A 30-DEG CONE ANGLE AND THE OTHER THREE WERE OMNIDIRECTIONAL DETECTORS. PARTICLES MEASURED WERE ELECTRONS BETWEEN 140 AND 600 KEV, ELECTRONS ABOVE 0.7, 1.55, AND 3.9 MEV, PROTONS IN THE INTERVALS FROM 2.3 TO 5.3, 3.4 TO 5.3, 12 TO 26, 20 TO 52, AND 40 TO 90 MEV, AND ALPHA PARTICLES IN THE INTERVALS FROM 9.4 TO 21.2, 13.4 TO 21.2, AND 46 TO 100 MEV. THE LOWEST ENERGY ELECTRON MODE AND THE TWO LOWEST ENERGY PROTON AND ALPHA PARTICLE MODES WERE DIRECTIONAL. ALL OTHER MODES WERE OMNIDIRECTIONAL. COUNTS WERE ACCUMULATED OVER 0.25 S EVERY 4 S FOR EACH ELECTRON MODE AND OVER 1 S EVERY 8 S FOR EACH PROTON MODE. FOR MORE DETAILS SEE PAULIKAS, G.A., BLAKE, J.B., IMAMOTO, S.S., 'ATS 6 ENERGETIC PARTICLE RADIATION MEASUREMENTS AT SYNCHRONOUS ALTITUDE' IEEE TRANS AEROSPACE AND ELECTRONIC SYSTEMS, AES-11, NO. 6, PAGE 1138.

----- ATS 6, WHALEN-----

INVESTIGATION NAME- HEALTH AND EDUCATION TELECOMMUNICATIONS

NSSDC ID- 74-039A-24 INVESTIGATIVE PROGRAM
CODE EC

INVESTIGATION DISCIPLINE(S)
COMMUNICATIONS

PERSONNEL
PI - A.A. WHALEN NASA-GSFC

BRIEF DESCRIPTION

THE S-BAND HEALTH, EDUCATION, TELECOMMUNICATIONS (HET) EXPERIMENT WAS FLOWN TO EVALUATE THE PERFORMANCE AND EFFECTIVENESS OF SATELLITE RELAY OF EDUCATIONAL PROGRAMMING AND HEALTH CARE DELIVERY TO FACILITIES SUCH AS SCHOOLS, NEW LEARNING CENTERS, HOSPITALS, CLINICS, AND COMMUNITY ANTENNA TELEVISION DISTRIBUTION SYSTEMS. THE SPACECRAFT WAS EQUIPPED WITH A TWO-CHANNEL TV TRANSMITTING CAPABILITY IN THE 2.5- TO 2.69-GHZ BAND. THE HET EXPERIMENT PROVIDED THE FIRST OPPORTUNITY TO USE SATELLITE COMMUNICATIONS FOR THE TRANSMISSION OF TV AND MULTIPLE VOICE CHANNELS TO LOW-COST EARTH STATIONS. THE SPACECRAFT INCLUDED A PRIME-FOCUS FEED COMPLEX HAVING A CROSSED-ARRAY OF SWITCHABLE BROADBAND S-BAND FEED ELEMENTS. TWO OF THESE FEED ELEMENTS WERE USED FOR THE HET EXPERIMENT. SIX EXPERIMENT COMPONENTS REQUIRING SEVEN DIFFERENT SPACECRAFT POINTINGS WERE INVOLVED IN THIS EXPERIMENT. THE SIX COMPONENTS WERE -- (1) APPALACHIAN REGIONAL COMMISSION EXPERIMENTS, (2) THE VETERANS ADMINISTRATION EXPERIMENTS, (3) SATELLITE TECHNOLOGY DEMONSTRATION, (4) WASHINGTON, ALASKA, MONTANA, AND IDAHO EXPERIMENTS, (5) ALASKA HEALTH SERVICES EXPERIMENTS, AND (6) ALASKA EDUCATION EXPERIMENTS.

***** BHASKARA*****

SPACECRAFT COMMON NAME- BHASKARA
ALTERNATE NAMES- SEO, 11392

NSSDC ID- 79-051A

LAUNCH DATE- 06/07/79 WEIGHT- 444. KG
LAUNCH SITE- UNKNOWN, U.S.S.R.
LAUNCH VEHICLE- UNKNOWN

SPONSORING COUNTRY/AGENCY
INDIA ISRO

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 06/07/79
ORBIT PERIOD- 95.2 MIN INCLINATION- 50.7 DEG
PERIAPSIS- 512. KM ALT APOAPSIS- 557. KM ALT

PERSONNEL
MG - S. DHAWAN INDIAN INST SCI
PM - U.R. RAO ISRO SATELLITE CENTER
PS - P.D. BHAVSAR SPACE APPLICATIONS CTR

BRIEF DESCRIPTION

BHASKARA, THE SECOND INDIAN SATELLITE, WAS LAUNCHED AS PART OF THEIR SATELLITE FOR EARTH OBSERVATIONS (SEO) PROGRAM. IT WAS PLACED IN ORBIT BY A U.S.S.R. VEHICLE LAUNCHED FROM A COSMODROME IN THE U.S.S.R. THE MAIN OBJECTIVES WERE TO CONDUCT EARTH OBSERVATION EXPERIMENTS FOR APPLICATIONS RELATED TO HYDROLOGY, FORESTRY, AND GEOLOGY USING A TWO-BAND TV CAMERA SYSTEM, AND TO CONDUCT OCEAN SURFACE STUDIES USING A TWO-FREQUENCY SATELLITE MICROWAVE RADIOMETER (SAMIR) SYSTEM. SECONDARY OBJECTIVES WERE TO TEST ENGINEERING AND DATA PROCESSING SYSTEMS, TO COLLECT LIMITED METEOROLOGICAL DATA FROM

REMOTE PLATFORMS, AND TO CONDUCT SCIENTIFIC INVESTIGATIONS IN X-RAY ASTRONOMY. BHASKARA WAS A 26-FACED QUASI-SPHERICAL POLYHEDRON. IT HAD A HEIGHT OF 1.66 M, A DIAMETER OF 1.55 M, AND A MASS OF 444 KG.

***** CAMEO*****

SPACECRAFT COMMON NAME- CAMEO
ALTERNATE NAMES- CHEM ACT MATLS EJECT ORB, 11081

NSSDC ID- 78-098B

LAUNCH DATE- 10/24/78 WEIGHT- 89. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 10/25/78
ORBIT PERIOD- 104.1 MIN INCLINATION- 99.3 DEG
PERIAPSIS- 952.0 KM ALT APOAPSIS- 953.0 KM ALT

PERSONNEL
PM - J.P. HEPPNER NASA-GSFC

BRIEF DESCRIPTION
THIS MISSION EMPLOYED THE SECOND STAGE OF THE DELTA LAUNCH VEHICLE FOR THE NIMBUS 7 SPACECRAFT TO PROVIDE TELEMETRY COMMAND, DATA STORAGE, AND HOUSE THE FOUR BARIUM AND ONE LITHIUM RELEASE CANNISTERS. THE PRIMARY OBJECTIVE OF THE INVESTIGATION WAS TO STUDY THE MAGNETOSPHERE-IONOSPHERE INTERACTIONS BY OBSERVING THE DYNAMICS OF NEUTRAL AND ION CLOUDS RELEASED AT ORBITAL VELOCITIES NEAR THE EARTH.

----- CAMEO, HEPPNER-----

INVESTIGATION NAME- BARIUM AND LITHIUM RELEASE MODULES

NSSDC ID- 78-098B-01 INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - J.P. HEPPNER NASA-GSFC

BRIEF DESCRIPTION
THIS INVESTIGATION CONSISTED OF A SEQUENTIAL RELEASE OF FOUR BARIUM CANNISTERS AND A SINGLE LONG-DURATION LITHIUM RELEASE FROM THE ORBITING SECOND STAGE OF THE NIMBUS 7 DELTA LAUNCH VEHICLE. THE BARIUM RELEASES OCCURRED OCTOBER 29, 1978, ALONG A TRACK NORTH OF ALASKA (79N TO 74N). THE BARIUM WAS OBSERVED BY MANY GROUND STATIONS AND WAS TRACKED FROM RELEASE AT ABOUT 900 KM OUT TO ABOUT 5 EARTH RADII DURING A ONE-HOUR PERIOD. THE LITHIUM RELEASE LASTED FOR 50 S OVER SOUTHERN SWEDEN ON NOVEMBER 6, 1978. OBSERVATIONS OF THE NEUTRAL AND ION CLOUDS WERE OBSERVED OPTICALLY BY VARIOUS GROUND SITES.

***** COS-B*****

SPACECRAFT COMMON NAME- COS-B
ALTERNATE NAMES- COSMIC RAY SATELLITE-B, PL-741B

NSSDC ID- 75-072A

LAUNCH DATE- 08/09/75 WEIGHT- 277.5 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 08/12/75
ORBIT PERIOD- 2227.0 MIN INCLINATION- 90.13 DEG
PERIAPSIS- 339.6 KM ALT APOAPSIS- 99876. KM ALT

PERSONNEL
PM - G. ALTMANN ESA-ESTEC
PS - R.D. WILLS ESA-ESTEC

BRIEF DESCRIPTION
THE COS-B SCIENTIFIC SATELLITE WAS DEVELOPED BY THE EUROPEAN SPACE AGENCY (ESA) TO STUDY EXTRATERRESTRIAL GAMMA RADIATION IN THE 25-MEV TO 1-GEV ENERGY RANGE FROM A HIGHLY ELLIPTICAL ORBIT OF ROUGHLY 100,000-KM APOGEE, 350-KM PERIGEE, AND NEAR-POLAR INCLINATION. NASA PROVIDED, ON A FULLY REIMBURSABLE BASIS, THE DELTA LAUNCH VEHICLE AND THE ASSOCIATED LAUNCH SERVICES. THE COS-B SPACECRAFT, WEIGHING 277.5 KG (610 LB), WAS A CYLINDER WITH A DIAMETER OF 140 CM AND A HEIGHT OF 121 CM. FOUR MONOPOLE ANTENNAS, PROTRUDING 51.2 CM BELOW THE BOTTOM OF THE CYLINDRICAL BODY, GAVE THE SPACECRAFT A TOTAL EFFECTIVE HEIGHT OF 172.2 CM. THE SPACECRAFT OBTAINED ORIENTATION OF ITS MOMENTUM VECTOR WITH RESPECT TO INERTIAL SPACE USING DATA FROM AN EARTH ALBEDO SENSOR AND A SOLAR SENSOR. SPACECRAFT ATTITUDE WAS ADJUSTED BY A NITROGEN COLD-GAS ATTITUDE CONTROL SYSTEM (ACS). THE ACS INCLUDED TWO SPIN-RATE-ADJUST NOZZLES TO MAINTAIN THE SPIN RATE AT 10 RPM AND TWO PRECESSION NOZZLES TO ADJUST THE MOMENTUM VECTOR. THE

SPACECRAFT HAD A PCM/PSK/PM TELEMETRY SYSTEM WITH 6.5-W REAL-TIME-ONLY TRANSMITTER PROVIDING A SWITCHABLE BIT RATE OF 160 AND 320 BPS AND A PCM/PSK/PM UP-LINK/DOWN-LINK, RANGE-TONE COMMAND SYSTEM. POWER WAS SUPPLIED BY 9480 SOLAR CELLS MOUNTED ON 12 SUBPANELS ON THE CYLINDRICAL BODY OF THE SPACECRAFT. COMMUNICATIONS, COMMAND, AND CONTROL OF THE COS-B SATELLITE IN ORBIT WERE PROVIDED BY THE ESA ESTRACK NETWORK. THE SPACECRAFT ENCLOSED A GAMMA-RAY ASTRONOMY EXPERIMENT DESCRIBED UNDER 'COS-B CARAVANE COLLABORATION' BELOW. MEMBERS OF THE UNIVERSITY AND RESEARCH GROUPS WHO IMPLEMENTED THIS SATELLITE ARE LISTED IN APPENDIX B2 WITH THEIR AFFILIATIONS.

----- COS-B, CARAVANE COLLABOR.-----

INVESTIGATION NAME- GAMMA-RAY ASTRONOMY SPARK CHAMBER
EXPERIMENT (25 - 1000 MEV)

NSSDC ID- 75-072A-01 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL
PI - CARAVANE COLLABOR. SEE APPENDIX B2

BRIEF DESCRIPTION
THIS EXPERIMENT USED A 16-DECK SPARK CHAMBER TO PERFORM GAMMA-RAY ASTRONOMY IN THE 25- TO 1000- MEV ENERGY INTERVAL. THE MISSION GOALS WERE -- (1) TO STUDY THE ANGULAR STRUCTURE OF THE SO-CALLED LINE-SOURCE OF RADIATION IN THE GALACTIC PLANE, (2) TO EXAMINE IDENTIFIED POINT SOURCES AND TO INVESTIGATE OTHER CELESTIAL OBJECTS, WHICH MAY BE EXPECTED TO EMIT GAMMA-RAYS (E.G., SUPERNOVA REMNANTS, QUASARS, NOVAE, ETC.), (3) TO MEASURE THE INTENSITY OF THE ISOTROPIC RADIATION FROM HIGH GALACTIC LATITUDES, (4) TO ASCERTAIN THE ENERGY SPECTRA OF RADIATION FROM ALL OBSERVED SOURCES, (5) TO SEARCH FOR LONG-TERM VARIATIONS IN THE STRENGTH OF SOURCES, AND (6) TO SEARCH FOR SHORT-PERIOD PULSATIONS FROM SOURCES ALREADY KNOWN TO BE PULSARS AT OTHER WAVELENGTHS AND TO DETECT GAMMA-RAY BURSTS. THE INSTRUMENT CONTAINED THE FOLLOWING KEY ELEMENTS (TOP TO BOTTOM) -- (1) ANTICINCIDENCE SCINTILLATION DOME, (2) 16-DECK SPARK CHAMBER (SC), (3) TRIGGERING TELESCOPE (TT), (4) ENERGY CALORIMETER (E), AND (5) CASCADE-PARTICLE PLASTIC SCINTILLATOR COUNTER (D). THE ANTICINCIDENCE COUNTER WAS A DOME OF SCINTILLATION PLASTIC, 10-MM THICK, VIEWED BY NINE PHOTOMULTIPLIER TUBES (PMT). IT DETECTED THE ENTRY OF CHARGED PARTICLES AND INHIBITED THE TRIGGERING OF THE SC. THE SC HAD 16 DECKS, EACH COMPOSED OF A PAIR OF ORTHOGONAL GRIDS OF 192 PARALLEL WIRES. THE TOP 12 DECKS WERE INTERLEAVED WITH TUNGSTEN PLATES AND THE LOWER 4 DECKS WITH MOLYBDENUM PLATES. THE SC WAS FILLED WITH NEON AT 12 ATM, PLUS A SMALL PERCENTAGE OF ETHANE. UPON CONVERSION OF A GAMMA RAY INTO AN ELECTRON-POSITRON PAIR, AN 8-KV VOLTAGE PULSE WAS APPLIED ACROSS THE DECKS CAUSING SPARK DISCHARGE ALONG THE IONIZATION TRACKS OF THE PAIR FROM WHICH THE ARRIVAL DIRECTION OF THE GAMMA RAY COULD BE DETERMINED. THE RECHARGE TIME OF THE SC HIGH VOLTAGE WAS 0.1 S. THE TT CONSISTED OF THREE ELEMENTS -- A 4-MM-THICK SCINTILLATION COUNTER (B1) ABLE TO IDENTIFY EVENTS IN WHICH AN E-P PAIR LEFT THE SC, A CERENKOV COUNTER (C) OF 30-MM-THICK PLEXIGLASS THAT WAS SENSITIVE TO RELATIVISTIC PARTICLES MOVING IN A DOWNWARD DIRECTION, AND A SECOND SCINTILLATOR (B2) 10-MM THICK. THE PRIMARY OBJECTIVES OF THE TT WERE TO DEFINE THE FIELD OF VIEW, TO DETECT THE DOWNWARD-MOVING ELECTRONS, AND TO PROVIDE THE FAST TRIGGER TO DISCHARGE THE SC. IT WAS POSSIBLE TO RESTRICT THE FIELD OF VIEW OF THE INSTRUMENT BY THE DIVISION OF THE C AND B2 COUNTERS INTO QUADRANTS, WHICH WERE VIEWED BY PMT OUTSIDE THE FIELD OF VIEW. THE PMT OUTPUTS WERE PULSE-HEIGHT ANALYSED TO PROVIDE INFORMATION ON THE NUMBERS OF PARTICLES LEAVING THE SC AND ENTERING THE CALORIMETER, E. THE E UNIT WAS A SINGLE CRYSTAL OF CESIUM IODIDE, 4.5 RADIATION LENGTHS THICK, IN WHICH THE E-P PAIR INITIATED AN ELECTRON-PHOTON CASCADE THAT WAS COMPLETELY ABSORBED AT LOW ENERGIES. AT HIGHER ENERGIES THE CASCADE PENETRATED TO THE FINAL PLASTIC SCINTILLATOR COUNTER, D. THE OUTPUT OF D WAS ANALYZED TO MEASURE THE NUMBER OF PARTICLES ESCAPING. INFORMATION FROM THE TT COUNTERS AND FROM THE SC PROVIDED A MEASURE OF THE ENERGY LOST BY SCATTERING OR ABSORPTION. THIS QUANTITY MUST BE ADDED TO THE CALORIMETER SIGNAL TO DERIVE THE ENERGY OF THE INCIDENT GAMMA RAY. THE ANTICINCIDENCE DOME WAS INSTRUMENTED TO DETECT GAMMA-RAY BURSTS, AND A SMALL 80-SQ CM ARGON-FILLED PROPORTIONAL COUNTER SENSITIVE TO X-RAYS BETWEEN 2 AND 12 KEV VIEWED PARALLEL TO THE AXIS OF THE MAIN GAMMA-RAY INSTRUMENT TO PROVIDE CONTEMPORARY X-RAY DATA ON AXIALLY LOCATED SOURCES.

***** COSMOS 900*****

SPACECRAFT COMMON NAME- COSMOS 900
ALTERNATE NAMES- 09898, OVAL

NSSDC ID- 77-023A

LAUNCH DATE- 03/30/77 WEIGHT- 900. KG
LAUNCH SITE- PLESETSK, U.S.S.R.
LAUNCH VEHICLE- C-1

SPONSORING COUNTRY/AGENCY
U.S.S.R.

SAS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 94.4 MIN
PERIAPSIS- 460. KM ALT

EPOCH DATE- 03/31/77
INCLINATION- 83. DEG
APOAPSIS- 523. KM ALT

PERSONNEL

PM - K.I. GRINGAUZ
PS - B.A. TVERSKOY

IKI
INST NUCLEAR PHYSICS

BRIEF DESCRIPTION

SPUTNIK COSMOS 900 CARRIED SCIENTIFIC APPARATUS, RADIO SYSTEM FOR PRECISE MEASUREMENTS OF ORBIT ELEMENTS, AND RADIO TELEMETRY SYSTEM.

----- COSMOS 900, AFONIN-----

INVESTIGATION NAME- FLAT RETARDING POTENTIAL ANALYZER

NSSDC ID- 77-023A-01

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - V.V. AFONIN
OI - V.V. BEZRUKIKH

IKI
IKI

BRIEF DESCRIPTION

NO INFORMATION GIVEN ON THE EXPERIMENT OTHER THAN THE NAMES SUPPLIED.

----- COSMOS 900, AFONIN-----

INVESTIGATION NAME- HIGH-FREQUENCY ELECTRON TEMPERATURE PROBE

NSSDC ID- 77-023A-02

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - V.V. AFONIN
OI - J.I. SMILAUER

IKI
GEOPHYS INST CAS

BRIEF DESCRIPTION

NO INFORMATION GIVEN ON THE EXPERIMENT OTHER THAN THE NAMES SUPPLIED.

----- COSMOS 900, GDALEVICH-----

INVESTIGATION NAME- SPHERICAL ION TRAP WITH FLOATING POTENTIAL

NSSDC ID- 77-023A-03

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - G.L. GDALEVICH
OI - V.D. OZEROV

IKI
IKI

BRIEF DESCRIPTION

NO INFORMATION GIVEN ON THE EXPERIMENT OTHER THAN THE NAMES SUPPLIED.

----- COSMOS 900, GDALEVICH-----

INVESTIGATION NAME- CYLINDRICAL ELECTROSTATIC PROBE

NSSDC ID- 77-023A-04

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - G.L. GDALEVICH
OI - V.F. GUBSKY

IKI
IKI

BRIEF DESCRIPTION

NO INFORMATION GIVEN ON THE EXPERIMENT OTHER THAN THE NAMES SUPPLIED.

----- COSMOS 900, GORTCHAKOV-----

INVESTIGATION NAME- RELATIVISTIC PROTON AND ELECTRON COUNTER

NSSDC ID- 77-023A-08

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - YE. V. GORTCHAKOV

INSY NUCLEAR PHYSICS

BRIEF DESCRIPTION

NO INFORMATION GIVEN ON THE EXPERIMENT OTHER THAN THE NAMES SUPPLIED.

----- COSMOS 900, SCHUTTE-----

INVESTIGATION NAME- PANORAMIC ELECTROSTATIC SPECTROMETER

NSSDC ID- 77-023A-07

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - N.M. SCHUTTE

IKI

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURED ELECTRONS AND PROTONS FROM 0.1 TO 20 KEV.

----- COSMOS 900, SOSNOVETS-----

INVESTIGATION NAME- DIFFERENTIAL ENERGY SPECTROMETER

NSSDC ID- 77-023A-05

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - E.N. SOSNOVETS
OI - M.I. PANASYUK

INST NUCLEAR PHYSICS
INST NUCLEAR PHYSICS

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURED TRAPPED ELECTRONS AND PROTONS USING JUNCTION SPECTROMETERS. ONE PROTON DETECTOR WITH AN ANGULAR APERTURE OF 60 DEG (GEOMETRIC FACTOR OF 0.3 SQ CM-SR) COVERED THE ENERGY RANGE 1-3 MEV, AND THE OTHER PROTON DEVICE WITH AN 18-DEG ANGULAR APERTURE (GEOMETRIC FACTOR OF 0.0084 SQ CM-SR) COVERED THE RANGE 80-130 KEV. THE ELECTRON DETECTOR WITH AN ANGULAR APERTURE OF 15 DEG (GEOMETRIC FACTOR OF 0.0034 SQ CM-SR) COVERED THE RANGE 80-130 KEV. FOR L.GT. 3, THE ANGLE BETWEEN THE DETECTOR AXES AND THE GEOMAGNETIC FIELD WAS 80 PLUS-MINUS 10 DEG.

----- COSMOS 900, TELTSOV-----

INVESTIGATION NAME- DIFFERENTIAL LOW ENERGY SPECTROMETER

NSSDC ID- 77-023A-06

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - M.V. TELTSOV

INST NUCLEAR PHYSICS

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURED ELECTRONS AND PROTONS FROM 0.5 TO 20 KEV.

----- COSMOS 900, TULUPOV-----

INVESTIGATION NAME- AURORAL PHOTOMETER

NSSDC ID- 77-023A-09

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - V.I. TULUPOV

INST NUCLEAR PHYSICS

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURED AURORAL LIGHT EMISSIONS AT 3914 A.

***** D5-B*****

SPACECRAFT COMMON NAME- D5-B

ALTERNATE NAMES- CASTOR, 07802

NSSDC ID- 75-039B

LAUNCH DATE- 05/17/75

WEIGHT- 76. KG

LAUNCH SITE- KOUROU (CENTRE SPATIAL GUYANAIS), FRANCE

LAUNCH VEHICLE- DIAMANT

SPONSORING COUNTRY/AGENCY

FRANCE

CNES

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 100.3 MIN
PERIAPSIS- 272. KM ALT
EPOCH DATE- 05/18/75
INCLINATION- 29.90 DEG
APOAPSIS- 1271. KM ALT

PERSONNEL
PM - A. OLIVERO
PS - F.E. BARLIER
CNES
CERGA

BRIEF DESCRIPTION
THIS FRENCH SPACECRAFT HAD A 26-FACE POLYHEDRON SHAPE WITH A DIAMETER OF 80 CM. THE PRIMARY MISSION OBJECTIVE WAS TO STUDY THE UPPER ATMOSPHERE DENSITY VARIATIONS. SECONDARY OBJECTIVES INCLUDED A STUDY OF GRAVITY FIELD PERTURBATIONS AND A STUDY OF MICROMETEORITE IMPACTS. A THREE-AXIS MAGNETOMETER WAS USED TO PROVIDE ATTITUDE INFORMATION. EACH ONE OF THE SPACECRAFT FACES CONTAINED A LASER REFLECTOR. DATA WERE MEASURED EITHER EVERY 0.1 S OR EVERY 2.8 S. THE DATA TRANSMISSION RATE WAS 1024 BITS/S FROM THE TAPE RECORDER AND EITHER 256 OR 512 BITS/S DIRECTLY FROM TELEMETRY. OPERATIONS WERE CONDUCTED BY THE OPERATIONS CENTER IN TOULOUSE USING THE CNES NETWORK OF TELEMETRY AND TELECOMMAND STATIONS.

----- D5-B, BARLIER-----

INVESTIGATION NAME- UPPER ATMOSPHERE DENSITY STUDY USING
ON-BOARD ACCELEROMETER

NSSDC ID- 75-039B-01
INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - F.E. BARLIER
CERGA

BRIEF DESCRIPTION
THIS ATMOSPHERIC DENSITY ACCELEROMETER EXPERIMENT PROVIDED DENSITY DATA FROM MEASUREMENTS OF THE SATELLITE DECELERATION DUE TO ATMOSPHERIC DRAG. THE ACCELEROMETER CONSISTED OF A BALL SUSPENDED IN A SPHERICAL CAVITY FORMING A CAPACITOR. DISPLACEMENT OF THE BALL WITH RESPECT TO THE CAVITY WAS MEASURED BY CAPACITANCE CHANGE. THE RANGE OF MEASUREMENT WAS 1.E-5 TO 1.E-9 M/S SQ WITH AN ACCURACY OF 1.5 PERCENT. IN-FLIGHT QUALIFICATION WAS ACHIEVED BY DISPLACING THE ACCELEROMETER WITH SMALL MASSES AND BY SPINNING THE SATELLITE TO INDUCE ARTIFICIAL INERTIA FORCES.

----- D5-B, BARLIER-----

INVESTIGATION NAME- MICROMETEORITE STUDY

NSSDC ID- 75-039B-03
INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST

PERSONNEL
PI - F.E. BARLIER
CERGA

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS EXPERIMENT WAS TO STUDY MICROMETEORITE IMPACTS.

***** DMSP-F1*****

SPACECRAFT COMMON NAME- DMSP-F1
ALTERNATE NAMES- DMSP 12535, DMSP BLOCK 5D-1
09415, DMSP501

NSSDC ID- 76-091A

LAUNCH DATE- 09/11/76
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- THOR
WEIGHT- 450. KG

SPONSORING COUNTRY/AGENCY
UNITED STATES
DOD-USAF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 101.6 MIN
PERIAPSIS- 818. KM ALT
EPOCH DATE- 09/14/76
INCLINATION- 98.7 DEG
APOAPSIS- 848. KM ALT

PERSONNEL
PM - J.J. MCGLINCHY
USAF-SAMSO

BRIEF DESCRIPTION
DMSP-F1 WAS ONE OF A SERIES OF METEOROLOGICAL SATELLITES DEVELOPED AND OPERATED BY THE AIR FORCE UNDER THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM (DMSP). THIS PROGRAM, PREVIOUSLY KNOWN AS DAPP (DATA ACQUISITION AND PROCESSING PROGRAM), WAS CLASSIFIED UNTIL MARCH 1973. THE OBJECTIVES OF THIS PROGRAM WERE TO PROVIDE GLOBAL VISUAL AND INFRARED CLOUD COVER DATA AND SPECIALIZED ENVIRONMENTAL DATA TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS. OPERATIONALLY, THE PROGRAM CONSISTED OF TWO SATELLITES IN PLANNED 830-KM SUN-SYNCHRONOUS POLAR ORBITS, WITH THE ASCENDING NODE OF ONE SATELLITE IN EARLY MORNING AND THE OTHER AT LOCAL NOON. THE 5.4-M-LONG SPACECRAFT WAS SEPARATED INTO FOUR SECTIONS: (1) A PRECISION MOUNTING PLATFORM (PMP) FOR SENSORS AND EQUIPMENT REQUIRING PRECISE

ALIGNMENT, (2) AN EQUIPMENT SUPPORT MODULE (ESM) CONTAINING THE ELECTRONICS, REACTION WHEELS, AND SOME METEOROLOGICAL SENSORS, (3) A REACTION CONTROL EQUIPMENT (RCE) SUPPORT STRUCTURE (THAT HAS THE THIRD-STAGE MOTOR, HYDRAZINE REACTION CONTROL SYSTEM) WHICH SUPPORTS (4) A 9.29 SQ M SOLAR CELL PANEL. THE BLOCK 5D SPACECRAFT STABILIZATION WAS CONTROLLED BY A COMBINATION FLYWHEEL AND MAGNETIC CONTROL COIL SYSTEM SO SENSORS COULD BE MAINTAINED IN THE DESIRED 'EARTH-LOOKING' MODE. ONE FEATURE OF BLOCK 5D WAS THE PRECISION-POINTING ACCURACY OF THE PRIMARY IMAGER TO 0.01 DEG PROVIDED BY A STAR SENSOR AND UPDATED EPHEMERIS NAVIGATION SYSTEM. THIS ALLOWED AUTOMATIC GEOGRAPHICAL MAPPING OF THE DIGITAL IMAGERY TO THE NEAREST PICTURE ELEMENT. THE OPERATIONAL LINE SCAN SYSTEM (OLS) BUILT BY WESTINGHOUSE, WAS THE PRIMARY DATA ACQUISITION SYSTEM THAT PROVIDED REAL-TIME OR STORED, MULTI-ORBIT, DAY-AND-NIGHT VISUAL AND INFRARED IMAGERY AT 1/3 NAUTICAL MILE RESOLUTION FOR ALL MAJOR LAND MASSES, 1-1/2 NAUTICAL MILE RESOLUTION FOR COMPLETE GLOBAL COVERAGE, AND PROVIDED WITH THIS DATA CALIBRATION, TIMING, AND OTHER AUXILIARY SIGNALS TO THE SPACECRAFT FOR DIGITAL TRANSMISSION TO THE GROUND. A SUPPLEMENTARY SENSOR PACKAGE, THE SPECIAL SENSOR H (SSH), A STEP-SCANNING RADIOMETER, WAS THE INFRARED TEMPERATURE-HUMIDITY-OZONE SOUNDER. THE DATA PROCESSING SYSTEM, WHICH INCLUDES THREE HIGH-DENSITY TAPE RECORDERS, WAS CAPABLE OF STORING A TOTAL OF 400 MIN OF DATA, EACH ALLOWING FULL GLOBAL COVERAGE TWICE DAILY. EITHER RECORDED OR REAL-TIME DATA WERE TRANSMITTED TO GROUND-RECEIVING SITES VIA TWO REDUNDANT S-BAND TRANSMITTERS. RECORDED DATA WERE READ OUT TO TRACKING SITES LOCATED AT FAIRCHILD AFB, WA, AND LORING AFB, ME, AND RELAYED VIA SATCOM TO AIR FORCE GLOBAL WEATHER CENTRAL, OFFUTT AFB, NE. REAL-TIME DATA WERE READ OUT AT MOBILE TACTICAL SITES LOCATED AROUND THE WORLD. A MORE COMPLETE DESCRIPTION OF THE BLOCK 5D SATELLITE CAN BE FOUND ON THE REPORT, 'THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, 4, JULY - AUGUST 1975.

----- DMSP-F1, AFGWC STAFF-----

INVESTIGATION NAME- OPERATIONAL LINESCAN SYSTEM (OLS)

NSSDC ID- 76-091A-01
INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SYS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - AFGWC STAFF
GLOBAL WEATHER CTR

BRIEF DESCRIPTION
THE OPERATIONAL LINESCAN SYSTEM (OLS) WAS THE PRIMARY EXPERIMENT ON THE DMSP BLOCK 5D SPACECRAFT. THE PURPOSE OF THIS EXPERIMENT WAS TO PROVIDE GLOBAL, DAY/NIGHT OBSERVATIONS OF CLOUD COVER AND CLOUD TEMPERATURE MEASUREMENTS TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS FOR OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE OLS EMPLOYED A SCANNING OPTICAL TELESCOPE DRIVEN IN AN OSCILLATING MOTION, WITH OPTICAL COMPENSATION FOR IMAGE MOTION, WHICH RESULTED IN NEAR-CONSTANT RESOLUTION THROUGHOUT THE SENSOR FIELD OF VIEW. THE RADIOMETER OPERATED IN TWO ('LIGHT' AND 'THERMAL') SPECTRAL INTERVALS -- (1) VISIBLE AND NEAR INFRARED (0.4 TO 1.1 MICROMETERS) AND (2) INFRARED (8 TO 13 MICROMETERS). THE RADIOMETER PRODUCED, WITH ONBOARD PROCESSING, DATA IN FOUR MODES -- LF (LIGHT FINE) AND TF (THERMAL FINE) DATA WITH A RESOLUTION OF .56 KM, AND LS (LIGHT SMOOTHED) AND TS (THERMAL SMOOTHED) DATA WITH A RESOLUTION OF 2.8 KM. THERE WERE THREE ONBOARD RECORDERS, AND EACH HAD A STORAGE CAPABILITY OF 400 MIN OF BOTH LS AND TS DATA OR 20 MIN OF LF AND TF DATA. FOR DIRECT READOUT TO TACTICAL SITES, THE EXPERIMENT WAS PROGRAMMED SO THAT LF AND TS DATA WERE OBTAINED AT NIGHT. THE INFRARED DATA (TF AND TS) COVERED A TEMPERATURE RANGE OF 210 TO 310 K WITH AN ACCURACY OF 1 DEG C. THE LS DATA MODE PROVIDED VISUAL DATA THROUGH A DYNAMIC RANGE FROM FULL SUNLIGHT DOWN TO A QUARTER MOON. THIS MODE ALSO AUTOMATICALLY ADJUSTED THE GAIN ALONG SCAN TO ALLOW USEFUL DATA TO BE OBTAINED ACROSS THE TERMINATOR. ADDITIONAL INFORMATION ON THIS EXPERIMENT IS CONTAINED IN THE REPORT, 'PRIMARY OPTICAL SUBSYSTEMS FOR DMSP BLOCK 5D,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, JULY-AUGUST 1975.

----- DMSP-F1, AFGWC STAFF-----

INVESTIGATION NAME- VERTICAL TEMPERATURE PROFILE RADIOMETER
SPECIAL SENSOR H (SSH)

NSSDC ID- 76-091A-02
INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SYS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - AFGWC STAFF
GLOBAL WEATHER CTR

BRIEF DESCRIPTION
SPECIAL SENSOR H (SSH) WAS A VERTICAL TEMPERATURE PROFILE RADIOMETER (VTPR). THE OBJECTIVE OF THIS EXPERIMENT WAS TO OBTAIN VERTICAL TEMPERATURE, WATER VAPOR, AND OZONE PROFILES OF THE ATMOSPHERE TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE SSH WAS A 16-CHANNEL SENSOR WITH ONE CHANNEL (1022 CM-1) IN THE 10-MICROMETER OZONE ABSORPTION BAND, ONE CHANNEL (835 CM-1) IN THE 12-MICROMETER ATMOSPHERIC WINDOW, SIX CHANNELS (747, 725, 708, 695, 676, 668.5 CM-1) IN THE 15-MICROMETER CO2 ABSORPTION BAND, AND EIGHT CHANNELS (535, 408.5, 441.5, 420, 374, 397.5,

355, 353.5, CM-1) IN THE 22- TO 30-MICROMETER ROTATIONAL WATER VAPOR ABSORPTION BAND. THE EXPERIMENT CONSISTED OF AN OPTICAL SYSTEM, DETECTOR AND ASSOCIATED ELECTRONICS, AND A SCANNING MIRROR. THE SCANNING MIRROR WAS STEPPED ACROSS THE SATELLITE SUBTRACK, ALLOWING THE SSH TO VIEW 25 SEPARATE COLUMNS OF THE ATMOSPHERE EVERY 32 S OVER A CROSS TRACK GROUND SWATH OF 2000 KM. WHILE THE SCANNING MIRROR WAS STOPPED AT A SCENE STATION, THE CHANNEL FILTERS WERE SEQUENCED THROUGH THE FIELD OF VIEW. THE SURFACE RESOLUTION WAS APPROXIMATELY 39 KM AT NADIR. RADIANCE DATA WERE TRANSFORMED INTO TEMPERATURE WATER VAPOR AND OZONE PROFILES BY A MATHEMATICAL INVERSION TECHNIQUE. A MORE COMPLETE DESCRIPTION OF THE EXPERIMENT CAN BE FOUND IN THE REPORT, 'DMSP BLOCK 5D SPECIAL METEOROLOGICAL SENSOR H, OPTICAL SUBSYSTEM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, 284-288, JULY-AUGUST 1975.

----- DMSP-F1, BLAKE-----

INVESTIGATION NAME- RADIATION DOSIMETER

NSSDC ID- 76-091A-03

INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - J.B. BLAKE	AEROSPACE CORP
GI - S.J. IMAMOTO	AEROSPACE CORP
OI - N. KATZ	AEROSPACE CORP
01 - W.A. KOLASINSKI	AEROSPACE CORP

BRIEF DESCRIPTION

THE PURPOSE OF THE GFE-3R DOSIMETER WAS TO MEASURE THE RADIATION DOSE IN SILICON UNDER ALUMINUM SHIELDING OF FOUR THICKNESSES REPRESENTATIVE OF BLOCK 5D DMSP SPACECRAFT. THE DOSIMETER, BUILT BY THE AEROSPACE CORPORATION SPACE SCIENCE LABORATORY, CONSISTED OF FOUR SEPARATE, SINGLE-DETECTOR UNITS. THESE OMNIDIRECTIONAL SENSORS WERE SMALL, CUBICAL, LITHIUM-DRIFTED, SILICON DETECTORS CENTERED UNDER HEMISPHERICAL SHELLS, AND HEAVILY SHIELDED (RELATIVE TO THE HEMISPHERICAL SHELL) OVER THE REAR 2 PI SOLID ANGLE. THE SHIELDING DOMES FOR THE FOUR SENSORS WERE 35, 75, 125, AND 200 MILS OF ALUMINUM, RESPECTIVELY. THE DOSIMETER DIRECTLY MEASURED THE IONIZATION IN THE SILICON CUBE CAUSED BY THE NATURAL RADIATION AND SERVED AS AN ELECTRON-PROTON SPECTROMETER, THUS YIELDING THE FLUENCES OF ENERGETIC ELECTRONS AND PROTONS ENCOUNTERED IN THE DMSP ORBIT, AS A FUNCTION OF TIME. FOUR INTEGRAL DISCRIMINATORS, WITH THRESHOLDS CORRESPONDING TO DEPOSITED ENERGY OF 25, 75, 300, AND 5000 KEV, WERE USED TO ANALYZE THE PULSE-HEIGHT SPECTRUM OF SIGNALS PRODUCED BY PROTONS, ELECTRONS, AND GAMMA RAYS ENTERING THE DETECTOR. INDIVIDUAL PULSES FROM THE 25, 300, AND 5000 KEV CHANNELS WERE COUNTED IN SCALING REGISTERS, WHICH ARE READ OUT AND RESET BY THE TELEMETRY SYSTEM EVERY THREE S. PULSES, WHOSE AMPLITUDES EXCEED THE GATING THRESHOLDS OF 25 KEV AND 75 KEV, WERE INTEGRATED INTO 1 MEV EQUIVALENT ENERGY PULSES (CORRESPONDING TO A DOSE OF 8.0E-6 RAD), WHICH WERE COUNTED BY A CUMULATIVE STORAGE REGISTER. THESE REGISTERS WERE READ OUT EVERY THREE SECONDS BUT NOT RESET BY THE TELEMETRY SO THAT THE NUMBER OF COUNTS READ OUT AT ANY TIME REPRESENTED THE TOTAL ENERGY IN MEV DEPOSITED IN THE SILICON ACTIVE VOLUME DURING THE MISSION LIFE. MAXIMUM ACCUMULATED DOSE STORAGE CORRESPONDED TO 5.5E5 RADS. ADDITIONAL INFORMATION CAN BE OBTAINED FROM AEROSPACE CORPORATION PUBLICATION NUMBER TOR-0077(2630)-1, JUNE 1977.

----- DMSP-F1, SHRUM-----

INVESTIGATION NAME- GAMMA RAY DETECTOR

NSSDC ID- 76-091A-04

INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
AERONOMY

PERSONNEL

PI - J. SHRUM	USAF TECH APPL CTR
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BRIEF DESCRIPTION

THE INSTRUMENT CONSISTED OF A FOUR-DETECTOR ARRAY OF CESIUM IODIDE SCINTILLATORS AND PHOTOMULTIPLIER TUBES EACH SURROUNDED BY A TANTALUM RING SHIELD TO PROVIDE A DIRECTIONAL SYSTEM. EACH DETECTOR WAS POSITIONED SO THAT ITS MOST SENSITIVE DIRECTION FACED 30 DEG FROM THE VERTICAL. PULSE-HEIGHT DISCRIMINATORS WERE USED TO PROVIDE GAMMA-RAY ENERGY LOSS THRESHOLDS OF 0.06, 0.15, AND 0.375 MEV. GAMMA RAYS PRODUCED IN THE ATMOSPHERE BY COSMIC RAYS, PRECIPITATING ELECTRONS, AND OTHER MEANS COULD BE MONITORED WITH THIS INSTRUMENT.

***** DMSP-F2*****

SPACECRAFT COMMON NAME- DMSP-F2
ALTERNATE NAMES-

NSSDC ID- 77-044A

LAUNCH DATE- 03/05/77

WEIGHT- 450. KG

LAUNCH SITE- VANDENBERG AFB, UNITED STATES

LAUNCH VEHICLE- THOR

SPONSORING COUNTRY/AGENCY
UNITED STATES

DOD-USAF

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 101.7 MIN
PERIAPSIS- 811. KM ALT

EPOCH DATE- 06/06/77
INCLINATION- 99. DEG
APOAPSIS- 869. KM ALT

PERSONNEL

PM - J.J. MCLINCHEY

USAF-SAMSO

BRIEF DESCRIPTION

DMSP-F2 WAS ONE OF A SERIES OF METEOROLOGICAL SATELLITES DEVELOPED AND OPERATED BY THE AIR FORCE UNDER THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM (DMSP). THIS PROGRAM, PREVIOUSLY KNOWN AS DAPP (DATA ACQUISITION AND PROCESSING PROGRAM), WAS CLASSIFIED UNTIL MARCH 1973. THE OBJECTIVES OF THIS PROGRAM WERE TO PROVIDE GLOBAL VISUAL AND INFRARED CLOUD COVER DATA AND SPECIALIZED ENVIRONMENTAL DATA TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS. OPERATIONALLY, THE PROGRAM CONSISTED OF TWO SATELLITES IN PLANNED 830-KM SUN-SYNCHRONOUS POLAR ORBITS, WITH THE ASCENDING NODE OF ONE SATELLITE IN EARLY MORNING AND THE OTHER AT LOCAL NOON. THE 5.4-M LONG SPACECRAFT WAS SEPARATED INTO FOUR SECTIONS: (1) A PRECISION MOUNTING PLATFORM (PMP) FOR SENSORS AND EQUIPMENT REQUIRING PRECISE ALIGNMENT, (2) AN EQUIPMENT SUPPORT MODULE (ESM) CONTAINING THE ELECTRONICS, REACTION WHEELS, AND SOME METEOROLOGICAL SENSORS, (3) A REACTION CONTROL EQUIPMENT (RCE) SUPPORT STRUCTURE (THAT HAS THE THIRD-STAGE MOTOR, HYDRAZINE REACTION CONTROL SYSTEM) WHICH SUPPORTS (4) A 9.29 SQ MM SOLAR CELL PANEL. THE SPACECRAFT STABILIZATION WAS CONTROLLED BY A COMBINATION FLYWHEEL AND MAGNETIC CONTROL COIL SYSTEM SO SENSORS COULD BE MAINTAINED IN THE DESIRED 'EARTH-LOOKING' MODE. ONE FEATURE WAS THE PRECISION-POINTING ACCURACY OF THE PRIMARY IMAGER TO 0.01 DEG PROVIDED BY A STAR SENSOR AND UPDATED EPHEMERIS NAVIGATION SYSTEM. THIS ALLOWED AUTOMATIC GEOGRAPHICAL MAPPING OF THE DIGITAL IMAGERY TO THE NEAREST PICTURE ELEMENT. THE OPERATIONAL LINE SCAN SYSTEM (OLS) BUILT BY WESTINGHOUSE, WAS THE PRIMARY DATA ACQUISITION SYSTEM THAT PROVIDED REAL-TIME OR STORED, MULTI-ORBIT, DAY-AND-NIGHT VISUAL AND INFRARED IMAGERY AT 1/3-NAUTICAL-MILE RESOLUTION FOR ALL MAJOR LAND MASSES, 1-1/2-NAUTICAL-MILE RESOLUTION FOR COMPLETE GLOBAL COVERAGE, AND PROVIDED WITH THIS DATA CALIBRATION, TIMING, AND OTHER AUXILIARY SIGNALS TO THE SPACECRAFT FOR DIGITAL TRANSMISSION TO THE GROUND. A SUPPLEMENTARY SENSOR PACKAGE, THE SPECIAL SENSOR H (SSH), A STEP-SCANNING RADIOMETER, WAS THE INFRARED TEMPERATURE-HUMIDITY-OZONE SOUNDER. THE DATA PROCESSING SYSTEM, WHICH INCLUDES THREE HIGH-DENSITY TAPE RECORDERS, WAS CAPABLE OF STORING A TOTAL OF 400 MIN OF DATA, EACH ALLOWING FULL GLOBAL COVERAGE TWICE DAILY. EITHER RECORDED OR REAL-TIME DATA WERE TRANSMITTED TO GROUND-RECEIVING SITES VIA TWO REDUNDANT S-BAND TRANSMITTERS. RECORDED DATA WERE READ OUT TO TRACKING SITES LOCATED AT FAIRCHILD AFB, WA, AND LORING AFB, ME, AND RELAYED VIA SATCOM TO AIR FORCE GLOBAL WEATHER CENTRAL, OFFUTT AFB, NE. REAL-TIME DATA WERE READ OUT AT MOBILE TACTICAL SITES LOCATED AROUND THE WORLD. A MORE COMPLETE DESCRIPTION OF THE SATELLITE CAN BE FOUND ON THE REPORT, 'THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, 4, JULY - AUGUST 1975.

----- DMSP-F2, AFGWC STAFF-----

INVESTIGATION NAME- OPERATIONAL LINESCAN SYSTEM (OLS)

NSSDC ID- 77-044A-01

INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SYS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI -	AFGWC STAFF	GLOBAL WEATHER CTR
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BRIEF DESCRIPTION

THE OPERATIONAL LINESCAN SYSTEM (OLS) WAS THE PRIMARY EXPERIMENT ON THE DMSP-F2 SPACECRAFT. THE PURPOSE OF THIS EXPERIMENT WAS TO PROVIDE GLOBAL, DAY/NIGHT OBSERVATIONS OF CLOUD COVER AND CLOUD TEMPERATURE MEASUREMENTS TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS FOR OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE OLS EMPLOYED A SCANNING OPTICAL TELESCOPE DRIVEN IN AN OSCILLATING MOTION, WITH OPTICAL COMPENSATION FOR IMAGE MOTION, WHICH RESULTED IN NEAR-CONSTANT RESOLUTION THROUGHOUT THE SENSOR FIELD OF VIEW. THE RADIOMETER OPERATED IN TWO ("LIGHT" AND "THERMAL") SPECTRAL INTERVALS: (1) VISIBLE AND NEAR INFRARED (0.4 TO 1.1 MICROMETERS) AND (2) INFRARED (8 TO 13 MICROMETERS). THE RADIOMETER PRODUCED, WITH ONBOARD PROCESSING, DATA IN FOUR MODES -- LF (LIGHT FINE) AND TF (THERMAL FINE) DATA WITH A RESOLUTION OF .56 KM, AND LS (LIGHT SMOOTHED) AND TS (THERMAL SMOOTHED) DATA WITH A RESOLUTION OF 2.8 KM. THERE WERE THREE ONBOARD RECORDERS, AND EACH HAD A STORAGE CAPABILITY OF 400 MIN OF BOTH LS AND TS DATA OR 20 MIN OF LF AND TF DATA. FOR DIRECT READOUT TO TACTICAL SITES, THE EXPERIMENT WAS PROGRAMMED SO THAT LF AND TS DATA WERE OBTAINED AT NIGHT. THE INFRARED DATA (TF AND TS) COVERED A TEMPERATURE RANGE OF 210 TO 310 K WITH AN ACCURACY OF 1 DEG C. THE LS DATA MODE PROVIDED VISUAL DATA THROUGH A DYNAMIC RANGE FROM FULL SUNLIGHT DOWN TO A QUARTER MOON. THIS MODE ALSO AUTOMATICALLY ADJUSTED THE GAIN ALONG SCAN TO ALLOW USEFUL

DATA TO BE OBTAINED ACROSS THE TERMINATOR. ADDITIONAL INFORMATION OF THIS EXPERIMENT IS CONTAINED IN THE REPORT, 'PRIMARY OPTICAL SUBSYSTEMS FOR DMSP,' D. A. NICHOLS, OPTICAL ENGINEERING, 14. NO. 4, JULY-AUGUST 1975.

----- DMSP-F2, AFGWC STAFF-----

INVESTIGATION NAME- VERTICAL TEMPERATURE PROFILE RADIOMETER
SPECIAL SENSOR H (SSH)

NSSDC ID- 77-044A-02 INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SYS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION
SPECIAL SENSOR H (SSH) WAS A VERTICAL TEMPERATURE PROFILE RADIOMETER (VTPR). THE OBJECTIVE OF THIS EXPERIMENT WAS TO OBTAIN VERTICAL TEMPERATURE, WATER VAPOR, AND OZONE PROFILES OF THE ATMOSPHERE TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE SSH WAS A 16-CHANNEL SENSOR WITH ONE CHANNEL (1022 CM-1) IN THE 10-MICROMETER OZONE ABSORPTION BAND, ONE CHANNEL (835 CM-1) IN THE 12-MICROMETER ATMOSPHERIC WINDOW, SIX CHANNELS (747, 725, 708, 695, 676, 668.5 CM-1) IN THE 15-MICROMETER CO2 ABSORPTION BAND, AND EIGHT CHANNELS (535, 408.5, 441.5, 420, 374, 397.5, 355, 353.5 CM-1) IN THE 22- TO 30-MICROMETER ROTATIONAL WATER VAPOR ABSORPTION BAND. THE EXPERIMENT CONSISTED OF AN OPTICAL SYSTEM, DETECTOR AND ASSOCIATED ELECTRONICS, AND A SCANNING MIRROR. THE SCANNING MIRROR WAS STEPPED ACROSS THE SATELLITE SUBTRACK, ALLOWING THE SSH TO VIEW 25 SEPARATE COLUMNS OF THE ATMOSPHERE EVERY 32 S OVER A CROSS TRACK GROUND SWATH OF 2000 KM. WHILE THE SCANNING MIRROR WAS STOPPED AT A SCENE STATION, THE CHANNEL FILTERS WERE SEQUENCED THROUGH THE FIELD OF VIEW. THE SURFACE RESOLUTION WAS APPROXIMATELY 39 KM AT NADIR. RADIANCE DATA WERE TRANSFORMED INTO TEMPERATURE WATER VAPOR AND OZONE PROFILES BY A MATHEMATICAL INVERSION TECHNIQUE. A MORE COMPLETE DESCRIPTION OF THE EXPERIMENT CAN BE FOUND IN THE REPORT, 'DMSP SPECIAL METEOROLOGICAL SENSOR H, OPTICAL SUBSYSTEM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, 284-288, JULY-AUGUST 1975.

----- DMSP-F2, MIZERA-----

INVESTIGATION NAME- REMOTE X-RAY SENSOR - PRECIPITATING
ELECTRONS

NSSDC ID- 77-044A-06 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
AERONOMY

PERSONNEL
PI - P.F. MIZERA AEROSPACE CORP

BRIEF DESCRIPTION
THE INSTRUMENT CONSISTED OF A LARGE-AREA PROPORTIONAL COUNTER AND FOUR CIRCULAR CADMIUM TELLURIDE (CDTE) SEMICONDUCTORS EMBEDDED IN A HEMISPHERICAL PLASTIC SCINTILLATOR THAT WAS VIEWED BY A PHOTOMULTIPLIER TUBE. THE SEALED PROPORTIONAL COUNTER HAD A COLLIMATOR AND WAS SENSITIVE TO X RAYS FROM 1.5 TO 20.2 KEV. THE CDTE DETECTORS HAD DISCRIMINATORS THAT PROVIDED THRESHOLD VALUES OF 15, 30, 60, AND 90 KEV. THE INVESTIGATION WAS PRIMARILY CONCERNED WITH X RAYS PRODUCED IN THE ATMOSPHERE BY PRECIPITATING ELECTRONS.

----- DMSP-F2, ROTHWELL-----

INVESTIGATION NAME- PRECIPITATING ELECTRON SPECTROMETER

NSSDC ID- 77-044A-03 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
AERONOMY

PERSONNEL
PI - P.L. ROTHWELL USAF GEOPHYS LAB

BRIEF DESCRIPTION
THE SPECTROMETER CONSISTED OF TWO DIFFERENT-SIZED CYLINDRICAL ELECTROSTATIC ANALYZERS (ESA) USING CHANNELTRON ELECTRON MULTIPLIERS. THE ESA'S POINTED TOWARD THE ZENITH IN ORDER TO MEASURE PRECIPITATING ELECTRONS. THE LARGE ESA HAD A FIELD OF VIEW (FOV) OF 1.6 BY 8.0 DEG WITH A DELTA E/E OF 0.04, WHILE THE SMALL ONE HAD A FOV OF 3.7 BY 4.8 DEG WITH A DELTA E/E OF 0.072. THE LARGE ESA COVERED THE RANGE FROM 1 TO 20 KEV AND THE OTHER ONE FROM 50 TO 1000 EV. A COMPLETE EIGHT-POINT SPECTRUM FROM EACH UNIT WAS OBTAINED IN 1 S.

----- DMSP-F2, SAGALYN-----

INVESTIGATION NAME- IONOSPHERIC PLASMA MONITOR

NSSDC ID- 77-044A-05 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
AERONOMY
IONOSPHERES

PERSONNEL
PI - R.C. SAGALYN USAF GEOPHYS LAB

BRIEF DESCRIPTION
THE INSTRUMENT CONSISTED OF ONE SPHERICAL (SEA) AND ONE PLANAR (PEA) ELECTROSTATIC ANALYZER. THE SEA PROVIDED MEASUREMENTS OF ELECTRON DENSITIES FROM 10 TO 1.E6/CUBIC CM IN THE TEMPERATURE RANGE FROM 200 TO 15,000 DEG K. THE PEA MEASURED ION TEMPERATURES IN THE SAME RANGE AS WELL AS THE AVERAGE ION MASS OVER THE RANGE 1 TO 35 U. THE PEA WAS ORIENTED IN THE DIRECTION OF THE POSITIVE SPACECRAFT VELOCITY VECTOR, WHILE THE SEA WAS ORIENTED AT RIGHT ANGLES TO THIS DIRECTION AND AWAY FROM THE SUN TO MINIMIZE THE EFFECT OF PHOTOELECTRONS. THE DEVICE ALSO PROVIDED A MEASUREMENT OF THE SPACECRAFT POTENTIAL.

----- DMSP-F2, SNYDER-----

INVESTIGATION NAME- PASSIVE IONOSPHERIC MONITOR

NSSDC ID- 77-044A-04 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
IONOSPHERES

PERSONNEL
PI - A.L. SNYDER USAF GEOPHYS LAB

BRIEF DESCRIPTION
THE INSTRUMENT CONSISTED OF A HIGH-FREQUENCY RADIO RECEIVER CONNECTED TO A SHORT ANTENNA THAT SWEEPED FROM 1.3 TO 13.9 MHZ IN 100-KHZ STEPS. THE DEVICE WAS USED TO MONITOR THE IONOSPHERIC BREAKTHROUGH FREQUENCY OF NOISE GENERATED BY MANMADE OR NATURAL SOURCES BELOW THE F2 LAYER TO OBTAIN THE CRITICAL FREQUENCY OF THIS LAYER (FOF2). THE FOF2 PARAMETER WAS USED IN CONSTRUCTING ELECTRON-DENSITY PROFILES USED IN FORECASTING THE STATE OF THE IONOSPHERE. THE INSTRUMENT COULD DETECT ELECTRIC FIELDS DOWN TO 10 MICROVOLTS/M.

***** DMSP-F3*****

SPACECRAFT COMMON NAME- DMSP-F3
ALTERNATE NAMES-

NSSDC ID- 78-042A

LAUNCH DATE- 05/01/78 WEIGHT- 450. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- THOR

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 05/02/78
ORBIT PERIOD- 96.89 MIN INCLINATION- 97.6 DEG
PERIAPSIS- 564. KM ALT APOAPSIS- 653. KM ALT

PERSONNEL
PM - J.J. MCGLINCHEY USAF-SAMSO

BRIEF DESCRIPTION
DMSP-F3 WAS ONE OF A SERIES OF METEOROLOGICAL SATELLITES DEVELOPED AND OPERATED BY THE AIR FORCE UNDER THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM (DMSP). THIS PROGRAM, PREVIOUSLY KNOWN AS DAPP (DATA ACQUISITION AND PROCESSING PROGRAM), WAS CLASSIFIED UNTIL MARCH 1973. THE OBJECTIVES OF THIS PROGRAM WERE TO PROVIDE GLOBAL VISUAL AND INFRARED CLOUD COVER DATA AND SPECIALIZED ENVIRONMENTAL DATA TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS. OPERATIONALLY, THE PROGRAM CONSISTED OF TWO SATELLITES IN SUN-SYNCHRONOUS POLAR ORBITS, WITH THE ASCENDING NODE OF ONE SATELLITE IN EARLY MORNING AND THE OTHER AT LOCAL NOON. THE 5.4-M-LONG SPACECRAFT WAS SEPARATED INTO FOUR SECTIONS: (1) A PRECISION MOUNTING PLATFORM (PMP) FOR SENSORS AND EQUIPMENT REQUIRING PRECISE ALIGNMENT, (2) AN EQUIPMENT SUPPORT MODULE (ESM) CONTAINING THE ELECTRONICS, REACTION WHEELS, AND SOME METEOROLOGICAL SENSORS, (3) A REACTION CONTROL EQUIPMENT (RCE) SUPPORT STRUCTURE (THAT HAS THE THIRD-STAGE MOTOR, HYDRAZINE REACTION CONTROL SYSTEM) THAT SUPPORTS (4) A 9-29 SQ M SOLAR CELL PANEL. THE SPACECRAFT STABILIZATION WAS CONTROLLED BY A COMBINATION FLYWHEEL AND MAGNETIC CONTROL COIL SYSTEM SO SENSORS COULD BE MAINTAINED IN THE DESIRED 'EARTH-LOOKING' MODE. ONE FEATURE WAS THE PRECISION-POINTING ACCURACY OF THE PRIMARY IMAGER TO 0.01 DEG PROVIDED BY A STAR SENSOR AND UPDATED EPHEMERIS NAVIGATION SYSTEM. THIS ALLOWED AUTOMATIC GEOGRAPHICAL MAPPING OF THE DIGITAL IMAGERY TO THE NEAREST PICTURE ELEMENT. THE OPERATIONAL LINE SCAN SYSTEM (OLS) BUILT BY WESTINGHOUSE, WAS THE PRIMARY DATA ACQUISITION SYSTEM THAT PROVIDED REAL-TIME OR STORED, MULTI-ORBIT, DAY-AND-NIGHT VISUAL AND INFRARED IMAGERY

AT 1/3-NAUTICAL-MILE RESOLUTION FOR ALL MAJOR LAND MASSES, 1-1/2-NAUTICAL-MILE RESOLUTION FOR COMPLETE GLOBAL COVERAGE, AND PROVIDED WITH THIS DATA CALIBRATION, TIMING, AND OTHER AUXILIARY SIGNALS TO THE SPACECRAFT FOR DIGITAL TRANSMISSION TO THE GROUND. A SUPPLEMENTARY SENSOR PACKAGE, THE SPECIAL SENSOR H (SSH), A STEP-SCANNING RADIOMETER, WAS THE INFRARED TEMPERATURE-HUMIDITY-OZONE SOUNDER. THE DATA PROCESSING SYSTEM, WHICH INCLUDED THREE HIGH-DENSITY TAPE RECORDERS, WAS CAPABLE OF STORING A TOTAL OF 400 MIN OF DATA, EACH ALLOWING FULL GLOBAL COVERAGE TWICE DAILY. EITHER RECORDED OR REAL-TIME DATA WERE TRANSMITTED TO GROUND-RECEIVING SITES BY TWO REDUNDANT S-BAND TRANSMITTERS. RECORDED DATA WERE READ OUT TO TRACKING SITES LOCATED AT FAIRCHILD AFB, WA, AND LORING AFB, ME, AND RELAYED BY SATCOM TO AIR FORCE GLOBAL WEATHER CENTRAL, OFFUTT AFB, NE. REAL-TIME DATA WERE READ OUT AT MOBILE TACTICAL SITES LOCATED AROUND THE WORLD. A MORE COMPLETE DESCRIPTION OF THE SATELLITE CAN BE FOUND IN THE REPORT, 'THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, 4, JULY - AUGUST 1975.

----- DMSP-F3, AFGWC STAFF-----

INVESTIGATION NAME- OPERATIONAL LINESCAN SYSTEM (OLS)

NSSDC ID- 78-042A-01 INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SYS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION

THE OPERATIONAL LINESCAN SYSTEM (OLS) WAS THE PRIMARY EXPERIMENT ON THE DMSP-F3 SPACECRAFT. THE PURPOSE OF THIS EXPERIMENT WAS TO PROVIDE GLOBAL, DAY/NIGHT OBSERVATIONS OF CLOUD COVER AND CLOUD TEMPERATURE MEASUREMENTS TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS FOR OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE OLS EMPLOYED A SCANNING OPTICAL TELESCOPE DRIVEN IN AN OSCILLATING MOTION, WITH OPTICAL COMPENSATION FOR IMAGE MOTION, WHICH RESULTED IN NEAR-CONSTANT RESOLUTION THROUGHOUT THE SENSOR FIELD OF VIEW. THE RADIOMETER OPERATES IN TWO ('LIGHT' AND 'THERMAL') SPECTRAL INTERVALS: (1) VISIBLE AND NEAR INFRARED (0.4 TO 1.1 MICROMETERS) AND (2) INFRARED (8 TO 13 MICROMETERS). THE RADIOMETER PRODUCED WITH ONBOARD PROCESSING, DATA IN FOUR MODES -- LF (LIGHT FINE) AND TF (THERMAL FINE) DATA WITH A RESOLUTION OF .56 KM, AND LS (LIGHT SMOOTHED) AND TS (THERMAL SMOOTHED) DATA WITH A RESOLUTION OF 2.8 KM. EACH OF THREE ONBOARD RECORDERS HAD A STORAGE CAPABILITY OF 400 MIN OF BOTH LS AND TS DATA OR 20 MIN OF LF AND TF DATA. FOR DIRECT READOUT TO TACTICAL SITES, THE EXPERIMENT WAS PROGRAMMED SO THAT LF AND TS DATA WERE OBTAINED AT NIGHT. THE INFRARED DATA (TF AND TS) COVERED A TEMPERATURE RANGE OF 210 TO 310 K WITH AN ACCURACY OF 1 DEG C. THE LS DATA MODE PROVIDED VISUAL DATA THROUGH A DYNAMIC RANGE FROM FULL SUNLIGHT DOWN TO A QUARTER MOON. THIS MODE ALSO AUTOMATICALLY ADJUSTED THE GAIN ALONG SCAN TO ALLOW USEFUL DATA TO BE OBTAINED ACROSS THE TERMINATOR. ADDITIONAL INFORMATION OF THIS EXPERIMENT IS CONTAINED IN THE REPORT, 'PRIMARY OPTICAL SUBSYSTEMS FOR DMSP,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, JULY - AUGUST 1975.

----- DMSP-F3, AFGWC STAFF-----

INVESTIGATION NAME- VERTICAL TEMPERATURE PROFILE RADIOMETER
SPECIAL SENSOR H (SSH)

NSSDC ID- 78-042A-02 INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SYS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION

SPECIAL SENSOR H (SSH) WAS A VERTICAL TEMPERATURE PROFILE RADIOMETER (VTFR). THE OBJECTIVE OF THIS EXPERIMENT WAS TO OBTAIN VERTICAL TEMPERATURE, WATER VAPOR, AND OZONE PROFILES OF THE ATMOSPHERE TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE SSH WAS A 16-CHANNEL SENSOR WITH ONE CHANNEL (1022 CM-1) IN THE 10-MICROMETER OZONE ABSORPTION BAND, ONE CHANNEL (835 CM-1) IN THE 12-MICROMETER ATMOSPHERIC WINDOW, SIX CHANNELS (747, 725, 708, 695, 676, 668.5 CM-1) IN THE 15-MICROMETER CO2 ABSORPTION BAND, AND EIGHT CHANNELS (535, 408.5, 441.5, 420, 374, 397.5, 355, 353.5 CM-1) IN THE 22- TO 30-MICROMETER ROTATIONAL WATER VAPOR ABSORPTION BAND. THE EXPERIMENT CONSISTED OF AN OPTICAL SYSTEM, DETECTOR AND ASSOCIATED ELECTRONICS, AND A SCANNING MIRROR. THE SCANNING MIRROR WAS STEPPED ACROSS THE SATELLITE SUBTRACK, ALLOWING THE SSH TO VIEW 25 SEPARATE COLUMNS OF THE ATMOSPHERE EVERY 32 S OVER A CROSS TRACK GROUND SWATH OF 2000 KM. WHILE THE SCANNING MIRROR WAS STOPPED AT A SCENE STATION, THE CHANNEL FILTERS WERE SEQUENCED THROUGH THE FIELD OF VIEW. THE SURFACE RESOLUTION WAS APPROXIMATELY 39 KM AT NADIR. THE RADIANCE DATA WERE TRANSFORMED INTO TEMPERATURE WATER VAPOR AND OZONE PROFILES BY A MATHEMATICAL INVERSION TECHNIQUE. A MORE COMPLETE DESCRIPTION OF THE EXPERIMENT CAN BE FOUND IN THE REPORT, 'DMSP SPECIAL METEOROLOGICAL SENSOR H, OPTICAL SUBSYSTEM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, 284-288, JULY-AUGUST 1975.

----- DMSP-F3, ROTHWELL-----

INVESTIGATION NAME- PRECIPITATING ELECTRON SPECTROMETER

NSSDC ID- 78-042A-03 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
AERONOMY
PARTICLES AND FIELDS

PERSONNEL
PI - P.L. ROTHWELL USAF GEOPHYS LAB

BRIEF DESCRIPTION

THE SPECTROMETER CONSISTED OF TWO DIFFERENT-SIZED CYLINDRICAL ELECTROSTATIC ANALYZERS (ESA) USING CHANNELTRON ELECTRON MULTIPLIERS. THE ESA'S POINTED TOWARD THE ZENITH IN ORDER TO MEASURE PRECIPITATING ELECTRONS COMING IN THE NADIR DIRECTION. THE LARGE ESA HAD A FIELD OF VIEW (FOV) OF 1.6 BY 8.0 DEG WITH A DELTA E/E OF 0.04, WHILE THE SMALL ONE HAD A FOV OF 3.7 BY 4.8 DEG WITH A DELTA E/E OF 0.072. THE LARGE ESA COVERED THE RANGE FROM 1 TO 20 KEV AND THE OTHER ONE FROM 50 TO 1000 EV. A COMPLETE EIGHT-POINT SPECTRUM FROM EACH UNIT IS OBTAINED IN 1 S.

----- DMSP-F3, SHRUM-----

INVESTIGATION NAME- GAMMA-RAY DETECTOR

NSSDC ID- 78-042A-04 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
AERONOMY

PERSONNEL
PI - J. SHRUM USAF TECH APPL CTR

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTED OF A FOUR-DETECTOR ARRAY OF CESIUM IODIDE SCINTILLATORS AND PHOTOMULTIPLIER TUBES EACH SURROUNDED BY A TANTALUM RING SHIELD TO PROVIDE A DIRECTIONAL SYSTEM. EACH DETECTOR WAS POSITIONED SO THAT ITS MOST SENSITIVE DIRECTION FACED 30 DEG FROM THE VERTICAL. PULSE-HEIGHT DISCRIMINATORS WERE USED TO PROVIDE GAMMA-RAY ENERGY LOSS THRESHOLDS OF 0.06, 0.15, AND 0.375 MEV. GAMMA-RAYS PRODUCED IN THE ATMOSPHERE BY COSMIC RAYS, PRECIPITATING ELECTRONS, AND OTHER MEANS CAN BE MONITORED WITH THIS INSTRUMENT.

***** ESA-GEOS 1*****

SPACECRAFT COMMON NAME- ESA-GEOS 1
ALTERNATE NAMES- GEOS, ESSEO
09931, ESA GEOS
GEOS 1

NSSDC ID- 77-029A

LAUNCH DATE- 04/20/77 WEIGHT- 273.6 KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC COMMENSURAT EPOCH DATE- 04/25/77
ORBIT PERIOD- 720.06 MIN INCLINATION- 26.25 DEG
PERIAPSIS- 2110. KM ALT APOAPSIS- 38357. KM ALT

PERSONNEL
PM - D.E. MULLINGER ESA-ESTEC
PS - K. KNOTT ESA-ESTEC

BRIEF DESCRIPTION

THE ESA-GEOS SPACECRAFT WAS TO HAVE BEEN THE FIRST SATELLITE PLACED IN THE EQUATORIAL GEOSTATIONARY ORBIT THAT WAS DEDICATED COMPLETELY TO SCIENTIFIC MEASUREMENTS. UNFORTUNATELY, A LAUNCH VEHICLE FAILURE MADE IT IMPOSSIBLE TO ACHIEVE THIS ORBIT AND RESULTED IN THE DECISION TO PLACE THE SPACECRAFT IN A 12-HR, COMMENSURATE, FINAL ORBIT WHERE THE INSTRUMENTS COULD MAKE THE PLANNED MEASUREMENTS FOR ABOUT 6 HOURS EACH REVOLUTION BETWEEN 5 AND 7 EARTH RADII. IN THIS ORBIT THE MISSION WAS STILL ABLE TO SERVE AS A CORE OR REFERENCE SPACECRAFT FOR THE INTERNATIONAL MAGNETOSPHERIC STUDY (IMS), AND CARRIED OUT PLANNED CORRELATIVE MEASUREMENTS WITH EXTENSIVE GROUND-BASED NETWORKS IN SCANDINAVIA AND CONJUGATE POINT MEASUREMENTS BETWEEN A STATION IN ICELAND AND IN ANTARCTICA. IN ADDITION, BECAUSE OF A SECOND DAILY APOGEE AT A DIFFERENT GEOGRAPHIC POSITION, CORRELATIVE MEASUREMENTS WITH IMS GROUND-BASED NETWORKS IN ALASKA AND WESTERN CANADA WERE ALSO CARRIED OUT. THE PAYLOAD CONSISTED OF INSTRUMENTS TO MEASURE -- (1) DC AND AC ELECTRIC AND MAGNETIC FIELDS; (2) GRADIENT OF THE MAGNETIC FIELD; (3) THERMAL AND SUPRATHERMAL PLASMA PARALLEL AND PERPENDICULAR TO THE MAGNETIC FIELD; (4) ENERGY SPECTRA, ANGULAR DISTRIBUTION, AND COMPOSITION OF POSITIVE IONS; AND (5) ANGULAR DISTRIBUTION AND ENERGY SPECTRA OF ENERGETIC ELECTRONS AND FOTONS. A DETAILED DESCRIPTION OF THE PAYLOAD CAN BE FOUND IN 'ESA SCIENTIFIC AND TECHNICAL REVIEW' (1975), 1, PP 173-196 BY K. KNOTT. THE SPACECRAFT WAS

CYLINDRICAL WITH A HEIGHT OF 1.321 M. THE TOTAL MASS EXCLUSIVE OF PROPELLANTS WAS 273.6 KG. THERE WERE FOUR TELESCOPIC AXIAL BOOMS OF 2.5 M LENGTH FOR THE MESHED WIRE SPHERES OF AN AC ELECTRIC FIELD EXPERIMENT; TWO 20 M CABLE BOOMS FOR MAGNETIC AND ELECTRIC FIELD SENSORS AND FOR AN EXCITATION ANTENNA FOR PLASMA RESONANCES; AND TWO LOCKING RADIANT BOOMS OF 3 M LENGTH FOR A VARIETY OF INSTRUMENTS. THERE WERE SIX HYDRAZINE THRUSTERS; TWO WERE TO TILT AND PRECESS THE SPACECRAFT, TWO WERE USED TO MODIFY THE ORBIT SO THE LONGITUDE OF THE APOGEE COULD BE MOVED TO DIFFERENT GEOGRAPHIC LOCATIONS, AND TWO WERE USED FOR SPIN UP AND SPIN DOWN. THE SPIN RATE WAS NOMINALLY 10 RPM. SINCE THIS MISSION WAS PLANNED FOR THE GEOSTATIONARY ORBIT, NO STORAGE OF DATA WAS PROVIDED. DATA WERE TELEMETERED IN REAL TIME AT 137.2 MHZ (186 AND 744 BPS) AND AT 2299.5 MHZ (11.91 OR 95.25 KBS). ALTITUDE MEASUREMENTS WERE OBTAINED BY A SUN SENSOR, DUAL INFRARED EARTH SENSOR, AND ACCELEROMETERS. POWER WAS SUPPLIED BY 7200 SOLAR CELLS MOUNTED ON THE CYLINDRICAL SPACECRAFT SURFACE. TO PREVENT SPACECRAFT DIFFERENTIAL CHARGING, 96 PERCENT OF THE SURFACE WAS ELECTRICALLY CONDUCTIVE. BECAUSE OF THE IMPORTANCE OF THE MAGNETIC FIELD MEASUREMENTS THE SPACECRAFT RESIDUAL FIELD AT THE MAGNETOMETER WAS ONLY 0.3 NT (GAMMA). MORE DETAILED INFORMATION ON THE SPACECRAFT CAN BE FOUND IN 'ESA BULLETIN' NO. 9, MAY 1977.

----- ESA-GEOS 1, BEGHIN-----

INVESTIGATION NAME- WAVE FIELD IMPEDANCE

NSSDC ID- 77-029A-11 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - C. BEGHIN CNRS, CTR FOR SPECTROM

BRIEF DESCRIPTION

THIS INVESTIGATION WAS PART OF ESA EXPERIMENT NO. S-300 AND MADE USE OF ONE SET OF MESHED ELECTRIC SPHERES MOUNTED ON THE END OF THE AXIAL BOOMS (PART OF 77-029A-10, UNGSTRUP) AND THE TWO VITREOUS CARBON SPHERES MOUNTED ON THE END OF THE 20-M RADIANT BOOMS (77-029A-07, PEDERSEN). THE MESHED SPHERES WERE USED AS TRANSMITTING ELEMENTS FOR FREQUENCIES FROM 0.2 TO 76 KHZ. THE SELF-IMPEDANCE OF THESE SPHERES AND THE MUTUAL IMPEDANCE BETWEEN THE MESHED AND LONG-BOOM CARBON SPHERES WERE MEASURED. STRONG RESONANCES AT THE HYBRID RESONANCE FREQUENCIES AND ANTI-RESONANCES AT THE GYRO FREQUENCIES WERE USED TO DETERMINE THE DENSITY OF THE SURROUNDING PLASMA. FREQUENCIES UP TO 450 HZ COULD BE TELEMETED DIRECTLY, AND SWEEP-FREQUENCY ANALYZERS AND A DIGITAL CORRELATION COULD BE EMPLOYED TO OBTAIN THE AUTO- AND/OR CROSS-CORRELATION UP TO 77 KHZ WITH SELECTABLE BANDWIDTHS OF 2.5, 5.0, OR 10.0 KHZ.

----- ESA-GEOS 1, GEISS-----

INVESTIGATION NAME- LOW-ENERGY ION COMPOSITION

NSSDC ID- 77-029A-03 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - J. GEISS U OF BERNE
PI - H.R. ROSENBAUER MPI-AERONOMY
OI - P.X. EBERHARDT U OF BERNE
OI - H. BALSIGER U OF BERNE
OI - A. GHIEMMETTI U OF BERNE
OI - H. LOIDL MPI-EXTRATERR PHYS
OI - D.T. YOUNG U OF BERNE

BRIEF DESCRIPTION

THIS INSTRUMENT (ESA EXPERIMENT NO. S-303) MEASURED THE ENERGY, ANGULAR DISTRIBUTION AND COMPOSITION OF POSITIVE IONS USING A CYLINDRICAL ELECTROSTATIC ANALYZER (ESA) FOLLOWED BY A CROSSED ELECTRIC AND MAGNETIC FIELD ANALYZER (CFA) TO SELECT THE ENERGY AND VELOCITY. THE ENERGY (PER UNIT CHARGE) RANGED FROM 0.001 TO 17.2 KEV IN 32 STEPS WITH A DELTA E/E OF 0.03 AND A MASS RANGE OF 1 TO 140 U IN 64 LOGARITHMICALLY SPACED STEPS. THERE WAS A THERMAL MODE IN WHICH A RETARDING GRID IN THE ENTRANCE SLIT WAS USED FOR ANALYSIS BELOW 0.1 KEV. ALL PARTICLES THAT OVERCAME THIS GRID VOLTAGE WERE ACCELERATED TO 3 KEV BEFORE ENTERING THE ESA IN ITS LOWEST ENERGY STEP, WHERE BOTH THE ESA AND THE CFA WERE TRANSPARENT. THE DEVICE VIEWED PERPENDICULAR TO THE SPIN OR Z AXIS. FOR LOW-ENERGY IONS THE ACCEPTANCE ANGLES WERE PLUS OR MINUS 6 DEG IN AZIMUTH AND PLUS OR MINUS 30 DEG IN ELEVATION (REFERENCED TO THE Z AXIS). FOR THE HIGHEST ENERGIES, THESE ANGLES DECREASED TO 3.5 AND 7.1 DEG, RESPECTIVELY. THREE PERCENT OF THE IONS LEAVING THE ESA WERE COUNTED BY A CHANNELTRON. THE REMAINING 97 PERCENT ENTERED THE CFA AND THE OUTPUT WAS DETECTED BY AN ELECTRON MULTIPLIER. THIS SIGNAL WAS PULSE-HEIGHT ANALYZED BY ONE FIXED AND ONE VARIABLE DISCRIMINATOR TO OBTAIN BETTER MASS DISCRIMINATION. THE MAIN PURPOSE OF THIS INVESTIGATION WAS TO IDENTIFY THE SOURCES OF LOW-ENERGY PARTICLES IN THE MAGNETOSPHERE. TIME VARIATIONS OF THE HELIUM/HYDROGEN RATIO, THE DEGREE OF IONIZATION OF HELIUM AND OXYGEN, AND THE ISOTOPIC ABUNDANCE RATIO OF HELIUM 3/HELIUM 4 COULD BE MEASURED TO DETERMINE THESE SOURCES. EARLIER IN THE LIFE OF THE SATELLITE,

A CORRELATIVE EXPERIMENT WITH THE CESIUM ION NEUTRALIZATION GUN ON ATS 6 WAS PERFORMED WHEN THE TWO SATELLITES WERE WITHIN SEVERAL KM ON THE SAME MAGNETIC FIELD LINE. THE ATS 6 GUN WAS FIRED FOR SOME PERIOD COMMENCING ABOUT 1 HOUR PRIOR TO THE ESA-GEOS 1 SATELLITE CROSSING THE MAGNETIC FIELD LINE SO THAT CESIUM IONS WOULD HAVE TIME TO POPULATE THE FLUX TUBE AND, SUBSEQUENTLY, BE DETECTED BY THIS EXPERIMENT. THIS WAS THE FIRST OF THIS TYPE OF CONTROLLED ACTIVE EXPERIMENT BETWEEN TWO SATELLITES.

----- ESA-GEOS 1, GENDRIN-----

INVESTIGATION NAME- MAGNETIC WAVE FIELDS

NSSDC ID- 77-029A-06

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - R.E. GENDRIN CNET
OI - J.M. ETCHEO CNET
OI - E. UNGSTRUP DANISH SPACE RES INST

BRIEF DESCRIPTION

THE INSTRUMENT USED TWO SETS OF THREE-AXIS SEARCH COIL MAGNETOMETERS, ONE FOR THE ULF/ELF RANGE (0.1 TO 450 HZ) AND ONE FOR THE VLF RANGE (0.3 TO 30 KHZ). EACH SEARCH COIL CONSISTED OF A HIGH-PERMEABILITY MATERIAL WITH A HIGH DENSITY PICK-UP WINDING. EACH SET OF THE THREE COILS IS BUILT INTO A SINGLE ASSEMBLY AND MOUNTED ON THE LOCKING 3-M BOOMS AT A DISTANCE OF 2 M FROM THE SPACECRAFT. TYPICAL SENSITIVITIES OF THESE SENSORS IN UNITS OF GAMMAS PER SQ ROOT OF HZ WERE 1.0E-1 AT 0.1 HZ, 2.0E-4 AT 10 HZ, AND ABOUT 3.0E-6 AT 1 KHZ. THESE SENSORS AND SOME ASSOCIATED ELECTRONICS CONSISTING OF (1) A LARGE NUMBER OF CHANNEL-SELECTION SWITCHES, (2) A NUMBER OF BANDPASS FILTERS, (3) SIX SWEEP-FREQUENCY ANALYZERS (SFA), (4) A DIGITAL CORRELATOR, AND (5) EIGHT STEPPED-GAIN AMPLIFIERS, COMPRISE PART OF THE ESA WAVE EXPERIMENT NO. S-300. THESE COMPONENTS WERE EMPLOYED FOR THE SENSORS DESCRIBED IN 77-029A-07 (PEDERSEN) AND -10 (UNGSTRUP), AND ALSO THE INVESTIGATIONS DESCRIBED IN -05 (PETIT) AND -11 (BEGHIN). SIX ANALOG CHANNELS OF 450 HZ BANDWIDTH AND THE DIGITAL CORRELATOR OUTPUT WERE TRANSMITTED VIA THE 95.25 KBS TELEMETRY MODE. THE SFAS COVERED THE FREQUENCY RANGE UP TO 77 KHZ IN 256 PARTLY OVERLAPPING STEPS. THE CORRELATOR PROVIDED AN AUTO-CORRELOGRAM OF 128 POINTS WITHIN 29 MS. ITS BANDWIDTH COULD BE SELECTED TO BE 2.5, 5.0, OR 10.0 KHZ. CROSS-CORRELOGRAM BETWEEN TWO SENSORS COULD BE PROVIDED. THE CORRELATOR COULD ALSO OPERATE IN A TIME-SHARING MODE BETWEEN AUTO- AND CROSS-CORRELATION.

----- ESA-GEOS 1, HULTQVIST-----

INVESTIGATION NAME- LOW-ENERGY ELECTRON AND PROTON PITCH
ANGLE DISTRIBUTION

NSSDC ID- 77-029A-04

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - B.K.G. HULTQVIST KIRUNA GEOPHYS INST
OI - H. BORG KIRUNA GEOPHYS INST
OI - L.A. HOLMGREN KIRUNA GEOPHYS INST

BRIEF DESCRIPTION

THIS INSTRUMENT (ESA EXPERIMENT NO. S-310) MEASURED THE ENERGY AND PITCH ANGLE DISTRIBUTION OF ELECTRONS AND PROTONS IN THE ENERGY RANGE 0.2 TO 20 KEV WITH EXTENSIVE ANGULAR COVERAGE CONCENTRATED IN THE LOSS CONE REGION. THE PURPOSE OF THE INVESTIGATION WAS TO IMPROVE THE UNDERSTANDING OF AURORAL PARTICLE ACCELERATION AND PRECIPITATION MECHANISMS BY COMPARING NEAR-EQUATORIAL PARTICLE DISTRIBUTIONS WITH COORDINATED GROUND-BASED OBSERVATIONS AT THE FOOT OF THE MAGNETIC FIELD LINE. HIGH TEMPORAL AND SPATIAL RESOLUTION OF THE INSTRUMENT WERE PROVIDED TO STUDY WAVE-PARTICLE INTERACTIONS. THE EXPERIMENT OF WILKEN (77-029A-01) IS COMPLEMENTARY TO THIS ONE, EXTENDING TO HIGH-ENERGY RANGES BOTH ELECTRON AND PROTON OBSERVATIONS. A TOTAL OF 10 CURVED-PLATE ANALYZERS WITH CHANNEL ELECTRON MULTIPLIERS FOR PARTICLE DETECTION WERE USED. ALTHOUGH NORMALLY EIGHT ANALYZERS WERE USED TO DETECT ELECTRONS AND TWO TO DETECT PROTONS, A COMPLEX ARRANGEMENT WITH FOUR SEPARATE HV SUPPLIES ALLOWED INDEPENDENT SWITCHING OF FOUR DETECTOR GROUPS. THE ANALYZING PLATE VOLTAGES COULD OPERATE IN A STEPPING MODE, A SWEEPING MODE, OR A CONSTANT-VOLTAGE MODE. IN ADDITION, THE TIME ACCUMULATION COULD BE VARIED WITH A NOMINAL FRAME DURATION OF 43 MS. HOWEVER, THIS DURATION COULD BE DECREASED BY A FACTOR OF FOUR AT THE EXPENSE OF OBTAINING DATA FROM CERTAIN DETECTORS IN THOSE CASES WHERE FAST TEMPORAL VARIATIONS WERE ENCOUNTERED IN THE LOSS CONE. THE ENERGY INTERVALS IN THE STEPPING MODE CONSISTED OF 32 ENERGY STEPS. THE EIGHT NORMAL ELECTRON ANALYZERS, WITH GEOMETRIC FACTOR (G) OF 3.0E-4 SQ CM-SR, CONSISTED OF FOUR NARROW-ANGLE (2 DEG X 2 DEG, DELTA E/E OF 0.11) AND FOUR WIDE-ANGLE (8 DEG X 7.5 DEG, DELTA E/E OF 0.09) DEVICES. THE TWO NORMAL PROTON ANALYZERS HAD DELTA E/E OF 0.13, APERTURE OF 6 DEG X 3 DEG, AND G OF 1.0E-3 SQ CM-SR. APERTURE ANGULAR WIDTHS REFER TO ELEVATION AND AZIMUTH, RESPECTIVELY, IN RELATION TO THE SPACECRAFT SPIN AXIS. THIS EXPERIMENT PLANNED TO RELY HEAVILY ON REAL-TIME

GROUND COMPUTER CONTROL. THIS WAS POSSIBLE OVER THE EASTERN LONGITUDE APOGEE IN VIEW OF THE ESA-GEOS 1 GROUND STATION ANTENNA AT MICHELSTADT, FEDERAL REPUBLIC OF GERMANY, BUT NOT FOR THE OTHER DAILY APOGEE OVER THE PACIFIC OCEAN.

----- ESA-GEOS 1, MARIANI-----

INVESTIGATION NAME- TRIAXIAL FLUXGATE MAGNETOMETER

NSSDC ID- 77-029A-09

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - F. MARIANI
OI - M. CANDIDI
OI - D.H. FAIRFIELD

SPACE PLASMA LAB
CNR, SPACE PLASMA LAB
NASA-GSFC

BRIEF DESCRIPTION

A TRIAXIAL FLUXGATE MAGNETOMETER IS EMPLOYED FOR SIMULTANEOUS MEASUREMENTS OF THE THREE COMPONENTS OF THE MAGNETIC FIELD. THE FREQUENCY RANGE COVERED BY THE INSTRUMENT EXTENDS FROM DC UP TO 5 HZ. IN THE NORMAL ORIENTATION OF THE SATELLITE, THE MAIN COMPONENT OF THE FIELD COINCIDES WITH THE Z-AXIS OF THE INSTRUMENT, WHICH IS ALIGNED WITH THE SPIN AXIS OF THE SATELLITE. THE EXPERIMENT HAS BEEN DESIGNED WITH TWO SENSITIVITY RANGES FOR THE X AND Y COMPONENTS FOR WHICH THE MAGNETIC FIELD COMPONENT IS ONLY A FRACTION OF THE TOTAL FIELD AND IS MODULATED BY THE ROTATION OF THE SPACECRAFT. THIS LAST FEATURE MAKES THE RANGE SWITCH TECHNIQUE PREFERABLE TO A BIAS OFFSET TECHNIQUE. THE TWO SELECTED SENSITIVITY RANGES ARE PLUS OR MINUS 60 NT (GAMMAS) AND PLUS OR MINUS 180 NT RESPECTIVELY. IN Z-AXIS, WHERE THE FIELD IS HIGHER AND NOT MODULATED BY THE SATELLITE ROTATION, A SINGLE SENSITIVITY RANGE OF PLUS OR MINUS 60 NT IS USED. THE SIGNAL IS KEPT WITHIN RANGE BY SUPERIMPOSING POSITIVE AND NEGATIVE BIAS LEVELS OF 60 NT EACH, SUCH THAT A RANGE PLUS OR MINUS 480 NT WITH A CONSTANT QUANTIZATION ERROR OF PLUS OR MINUS 0.125 USING A 9-BIT DIGITISATION IS OBTAINED. THE NOISE LEVEL OF THE SENSORS IS COMPARABLE TO THIS QUANTIZATION ERROR. THIS INSTRUMENT SATURATES AT GEOCENTRIC DISTANCES LESS THAN ABOUT 4.5 EARTH RADII.

----- ESA-GEOS 1, PEDERSEN-----

INVESTIGATION NAME- DC FIELDS BY DOUBLE PROBE

NSSDC ID- 77-029A-07

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - A. PEDERSEN
OI - D. JONES
OI - K. KNOTT
OI - R.J.L. GRARD

ESA-ESTEC
ESA-ESTEC
ESA-ESTEC
ESA-ESTEC

BRIEF DESCRIPTION

THIS INSTRUMENT CONSISTED OF TWO VITREOUS CARBON SPHERES MOUNTED AT THE TIPS OF THE 20-M CABLE BOOMS, WHICH EXTEND RADIALLY FROM THE SPACECRAFT PERPENDICULAR TO THE SPIN AXIS AND COMPRISED PART OF THE ESA NO. S-300 WAVE EXPERIMENT. THIS INVESTIGATION WAS CONCERNED WITH THE DC SINGLE-AXIS ELECTRIC FIELD ANALYSIS. THE TWO OUTPUT SIGNALS WERE EVALUATED IN TERMS OF DC ELECTRIC FIELD AND CONDITIONED FOR FURTHER TREATMENT IN THE ANALYSIS OF AC ELECTRIC FIELDS. THE OUTPUT FROM ONE SPHERE WAS SIGNAL CONDITIONED ON A LINEAR SCALE; THE DIFFERENTIAL OUTPUT FROM THE TWO SPHERES WAS COMPRESSED LOGARITHMICALLY. IN ADDITION, THE TWO OUTPUTS WERE PASSED THROUGH 450 HZ TO 77 KHZ FILTERS. THESE FILTERED SIGNALS WERE DIFFERENCED AND ALL THREE SIGNALS MADE AVAILABLE FOR ANALYSIS BY THE SWEEP-FREQUENCY ANALYZERS AND DIGITAL CORRELATOR AS PART OF 77-029A-05 (PETIT), -10 (UNGSTRUP), AND -01 (BEGHIN) INVESTIGATIONS. THE SENSITIVITY OF THIS PROBE WAS ABOUT $1.0E-4$ V/M AT DC AND $1.0E-8$ V/M TIMES THE SQUARE ROOT OF HZ.

----- ESA-GEOS 1, PETIT-----

INVESTIGATION NAME- VLF PLASMA RESONANCES

NSSDC ID- 77-029A-05

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - M. PETIT

CNET

BRIEF DESCRIPTION

THIS INVESTIGATION (PART OF ESA EXPERIMENT NO. S-300) UTILIZED THE 20-M BOOMS (NORMAL TO THE SPACECRAFT SPIN AXIS) AS A DIPOLE ANTENNA, AND THE CARBON SPHERES (PART OF 77-029A-07, PEDERSEN) AS THE RECEIVING ELEMENT. FREQUENCIES FROM 0.3 TO 77 KHZ WERE EMPLOYED. ON TRANSMISSION OF A VLF SIGNAL OF LIMITED DURATION, A TRANSIENT SIGNAL WAS OBSERVED FOR A MUCH LONGER PERIOD THAN THE PULSE LENGTH, PROVIDED THE SPECTRUM OF THE

TRANSMITTED SIGNAL INCLUDED ONE OF THE RESONANCE FREQUENCIES OF THE PLASMA. THE AMBIENT PLASMA DENSITY COULD BE INFERRED FROM THE DETERMINATION OF THE RESONANT FREQUENCIES. RECEIVED FREQUENCIES UP TO 450 HZ WERE TELEMETERED DIRECTLY, AND SIX SWEEP-FREQUENCY ANALYZERS AND A DIGITAL CORRELATOR PROVIDED AUTO- AND CROSS-CORRELATIONS UP TO 77 KHZ. BANDWIDTHS OF 2.5, 5.0, OR 10.0 KHZ COULD BE SELECTED FOR THE CORRELATOR.

----- ESA-GEOS 1, UNGSTRUP-----

INVESTIGATION NAME- ELECTRIC WAVE FIELDS

NSSDC ID- 77-029A-10

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - E. UNGSTRUP

DANISH SPACE RES INST

BRIEF DESCRIPTION

THIS INVESTIGATION WAS PART OF THE ESA NO. S-300 WAVE EXPERIMENT AND EMPLOYED THE FOUR MESH SPHERES MOUNTED AT THE END OF THE 2.5 M AXIAL BOOMS. ONE OF THESE BOOMS ONLY EXTENDED TO 1.95 M, BUT THIS DID NOT AFFECT THE INSTRUMENT EXCEPT TO REQUIRE A RECALIBRATION. DIFFERENTIAL MEASUREMENTS FROM THESE SENSORS PROVIDED THE THREE VECTOR COMPONENTS OF THE ELECTRIC FIELD. FREQUENCIES FROM 50 HZ TO 77 KHZ COULD BE ANALYZED WITH THE SWEEP-FREQUENCY ANALYZER AND THE DIGITAL CORRELATOR. FREQUENCIES UP TO 450 HZ COULD BE TELEMETERED DIRECTLY, AND AUTO- AND/OR CROSS-CORRELATION OF THE SENSOR OUTPUTS UP TO 77 KHZ COULD BE ACCOMPLISHED WITH SELECTABLE BANDWIDTHS OF 2.5, 5.0, OR 10.0 KHZ. THE SENSITIVITY OF THE MESH SPHERE PROBES AT 10 KHZ WAS $1.0E-6$ V/M TIMES THE SQUARE ROOT OF HZ.

----- ESA-GEOS 1, WILKEN-----

INVESTIGATION NAME- ELECTRON AND PROTON PITCH ANGLE DISTRIBUTION

NSSDC ID- 77-029A-01

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - B. WILKEN
OI - G. PFOTZER (RETIRED)
OI - E. KEPPLER
OI - A. KORTH
OI - J. MUENCH

MPI-AERONOMY
MPI-AERONOMY
MPI-AERONOMY
MPI-AERONOMY
MPI-AERONOMY

BRIEF DESCRIPTION

THIS INSTRUMENT (ESA EXPERIMENT NO. S-321) MEASURED THE ENERGY AND PITCH ANGLE DISTRIBUTION OF HIGHER ENERGY ELECTRONS AND PROTONS THAN THAT OF HULTQVIST (77-029A-04), AND WAS COMPLEMENTARY TO THAT INSTRUMENT. THE DETECTOR SYSTEM CONSISTED OF TWO SEPARATE MAGNETIC SPECTROMETERS FOR ELECTRONS WITH TWO PROTON TELESCOPES ASSOCIATED WITH EACH OF THE MAGNETS THAT SERVED TO FOCUS THE ELECTRONS AWAY FROM THE PROTON DETECTORS. THERE WERE FIVE RECTANGULAR SOLID-STATE DETECTORS MOUNTED ALONG THE FOCAL LINE OF EACH SPECTROMETER TO MEASURE THE ELECTRONS. EACH SPECTROMETER COVERED AN ANGULAR APERTURE IN ELEVATION ANGLE (RELATIVE TO THE SPIN AXIS) OF 60 DEG. THE TWO DEFLECTION MAGNETS WERE POSITIONED SO THAT ELEVATION ANGLES (REFERRED TO THE SPIN AXIS) FROM 10 TO 120 DEG, ON 10 DEG CENTERS, WERE COVERED FOR ELECTRONS, GIVING ELEVATION ANGLES OF 23, 46, 93, AND 106 DEG FOR THE PROTON TELESCOPES. THESE TELESCOPES CONSISTED OF A FRONT SURFACE-BARRIER DETECTOR AND A REAR SOLID-STATE DETECTOR. ELECTRON ENERGIES FROM 30 TO 200 KEV AND PROTON ENERGIES FROM 0.04 TO 1.4 MEV WERE COVERED. THE EFFECTIVE ANGULAR APERTURE FOR PROTONS WAS 10 DEG X 4 DEG (ELEVATION X AZIMUTH) AND FOR ELECTRONS WAS 6 DEG X 4 DEG. GEOMETRIC FACTORS IN UNITS OF $1.0E-4$ SQ CM-SR WERE FIVE FOR PROTONS AND ONE FOR ELECTRONS. A 12-CHANNEL PULSE-HEIGHT ANALYZER (PHA) FOR PROTONS COULD BE USED FOR ANY ONE OF THE FOUR FRONT DETECTORS, PROVIDED A FRONT-REAR COINCIDENCE WAS DETECTED, AND A 15-CHANNEL PHA COULD BE USED FOR ANY ONE OF THE 10 ELECTRON DETECTORS. THE SINGLES RATE FOR ONE OF THE FOUR PROTON DETECTORS AND THE COINCIDENCE RATE FROM ONE OF THE FOUR PROTON TELESCOPES COULD BE SELECTED. THERE WERE THREE MODES FOR DATA SELECTION -- MODE 0, INTEGRAL COUNT RATES AND SPECTRAL MEASUREMENTS FOR ALL 14 DETECTORS; MODE 1, INTEGRAL COUNT RATES AND SPECTRAL MEASUREMENTS FOR FOUR DETECTORS -- GOOD TIME RESOLUTION ON INTEGRAL RATES; AND MODE 2, INTEGRAL COUNT RATES AND SPECTRAL MEASUREMENTS -- GOOD TIME RESOLUTION FOR ENERGY SPECTRA. THE MINIMUM TIME FOR A COMPLETE SPECTRUM WAS 688 MS; THE MINIMUM TIME FOR INTEGRAL FLUX VARIATIONS WAS 40 MS. THE SPECTRAL MEASUREMENTS HAD A RESOLUTION OF DELTA E/E = 0.35.

----- ESA-GEOS 1, WRENN-----

INVESTIGATION NAME- THERMAL PLASMA FLOW

NSSDC ID- 77-029A-02

INVESTIGATIVE PROGRAM
SCIENCEINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - G.L. WRENN	U COLLEGE LONDON
OI - R.L.F. BOYD	U COLLEGE LONDON
OI - K. NORMAN	U COLLEGE LONDON
OI - W.J. RAITT	UTAH STATE U

BRIEF DESCRIPTION

THE INSTRUMENT (ESA EXPERIMENT NO. S-302) EMPLOYED TWO HEMISPHERICAL ELECTROSTATIC ANALYZERS MOUNTED ON ONE OF THE LOCKING BOOMS FOR THE MEASUREMENT OF ELECTRONS OR PROTONS OVER THE RANGE 0.5 TO 500 EV ARRIVING CLOSE TO PARALLEL AND CLOSE TO PERPENDICULAR TO THE LOCAL MAGNETIC FIELD. THE ENERGY RANGE WAS COVERED IN 64 STEPS WITH A RELATIVE ENERGY RESOLUTION OF 0.11. ONE ANALYZER HAD ITS APERTURE POINTING ALONG THE NEGATIVE (Z) SPIN AXIS WITH AN OPENING ANGLE OF 18 DEG X 18 DEG PROVIDING A GEOMETRICAL FACTOR (G) OF $6.0E-4$ SQ CM-SR. THE OTHER ANALYZER MADE AN ANGLE OF 100 DEG WITH RESPECT TO THE +Z AXIS WITH AN OPENING ANGLE OF 8 DEG X 30 DEG PROVIDING A G OF $5.0E-4$ SQ CM-SR. BOTH DETECTORS HAD TO MEASURE THE SAME TYPE OF PARTICLES AT THE SAME TIME. THE COLLIMATORS OF THESE INSTRUMENTS COULD BE SET AT ANY VOLTAGE FROM -28 TO +32 V IN STEPS OF 0.1 V TO COMPENSATE FOR THE POTENTIAL DIFFERENCE BETWEEN THE INSTRUMENT AND THE UNDISTURBED PLASMA ENVIRONMENT. THIS VOLTAGE DETERMINED THE SPACECRAFT POTENTIAL.

***** ESA-GEOS 2*****

SPACECRAFT COMMON NAME- ESA-GEOS 2
ALTERNATE NAMES- GEOSARI, 10981

NSSDC ID- 78-071A

LAUNCH DATE- 07/14/78 WEIGHT- 273.6 KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTASPONSORING COUNTRY/AGENCY
INTERNATIONAL ESAINITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 08/06/78
ORBIT PERIOD- 1431.2 MIN INCLINATION- 0.772 DEG
PERIAPOSSIS- 35615.5 KM ALT APOAPSIS- 35774.1 KM ALT

PERSONNEL

PM - D.E. MULLINGER	ESA-ESTEC
PS - K. KNOTT	ESA-ESTEC

BRIEF DESCRIPTION

ESA-GEOS 2 WAS THE FIRST SPACECRAFT PLACED IN A EQUATORIAL GEOSTATIONARY ORBIT DEDICATED COMPLETELY TO SCIENTIFIC MEASUREMENTS. THE SPACECRAFT SERVED AS A CORE OR REFERENCE SPACECRAFT FOR THE INTERNATIONAL MAGNETOSPHERIC STUDY (IMS) AND CARRIED OUT CORRELATIVE MEASUREMENTS WITH EXTENSIVE GROUND-BASED NETWORKS IN SCANDINAVIA. THE PAYLOAD CONSISTED OF INSTRUMENTS TO MEASURE: (1) DC AND AC ELECTRIC AND MAGNETIC FIELDS; (2) GRADIENT OF THE MAGNETIC FIELD; (3) THERMAL AND SUPRATHERMAL PLASMA PARALLEL AND PERPENDICULAR TO THE MAGNETIC FIELD; (4) ENERGY SPECTRA, ANGULAR DISTRIBUTION, AND COMPOSITION OF POSITIVE IONS; AND (5) ANGULAR DISTRIBUTION AND ENERGY SPECTRA OF ENERGETIC ELECTRONS AND PROTONS. THE SPACECRAFT WAS CYLINDRICAL WITH A HEIGHT OF 1.321 M. THE TOTAL MASS, EXCLUDING PROPELLANTS, WAS 273.6 KG. THERE WERE FOUR TELESCOPIC AXIAL BOOMS 2.5 M IN LENGTH FOR THE MESHED WIRE SPHERES OF AN AC ELECTRIC FIELD EXPERIMENT, TWO 20-M CABLE BOOMS FOR MAGNETIC AND ELECTRIC FIELD SENSORS AND FOR AN EXCITATION ANTENNA FOR PLASMA RESONANCES, AND TWO LOCKING RADIANT BOOMS 3 M IN LENGTH FOR A VARIETY OF INSTRUMENTS. THERE WERE SIX HYDRAZINE THRUSTERS, TWO TO TILT AND PRECESS THE SPACECRAFT, TWO TO MODIFY THE ORBIT SO THE LONGITUDE OF THE APOGEE COULD BE CHANGED, AND TWO FOR SPIN UP AND SPIN DOWN. THE SPIN RATE WAS NOMINALLY 10 RPM. DATA WERE TELEMETERED IN REAL TIME AT 137.2 MHZ (186 AND 744 BPS) AND AT 2299.5 MHZ (11.91 OR 95.25 KBS). ALTITUDE MEASUREMENTS WERE OBTAINED BY A SUN SENSOR, A DUAL INFRARED EARTH SENSOR, AND ACCELEROMETERS. POWER WAS SUPPLIED BY 7200 SOLAR CELLS MOUNTED ON THE SPACECRAFT SURFACE. TO PREVENT SPACECRAFT DIFFERENTIAL CHARGING, 96 PERCENT OF THE SURFACE WAS ELECTRICALLY CONDUCTIVE. BECAUSE OF THE IMPORTANCE OF THE MAGNETIC FIELD MEASUREMENTS, THE SPACECRAFT RESIDUAL FIELD AT THE MAGNETOMETER IS ONLY 0.3 NT (GAMMAS). EXCEPT FOR MINOR MODIFICATIONS TO CERTAIN EXPERIMENTS, THIS SPACECRAFT AND INSTRUMENTS WERE IDENTICAL TO ESA-GEOS 1 (77-029A) AND MORE DETAILED INFORMATION CAN BE FOUND IN 'ESA BULLETIN' NO. 9 MAY 1977. ONE SOLAR PANEL DEVELOPED A SHORT CIRCUIT SOON AFTER LAUNCH AND A NUMBER OF THE EXPERIMENTS COULD OBTAIN USEFUL DATA ONLY FOR ONE HALF OF THE SPIN PERIOD.

----- ESA-GEOS 2, BEGHIN-----

INVESTIGATION NAME- WAVE FIELD IMPEDANCE

NSSDC ID- 78-071A-11

INVESTIGATIVE PROGRAM
SCIENCEINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - C. BEGHIN CNRS, CTR FOR SPECTROM

BRIEF DESCRIPTION

THIS INVESTIGATION WAS PART OF ESA EXPERIMENT NO. S-300 AND MADE USE OF ONE SET OF MESHED ELECTRIC SPHERES MOUNTED ON THE END OF THE AXIAL BOOMS (PART OF 78-071A-10, UNGSTRUP) AND THE TWO VITREOUS CARBON SPHERES MOUNTED ON THE END OF THE 20-M RADIAL BOOMS (78-071A-07, PEDERSEN). THE MESHED SPHERES WERE USED AS TRANSMITTING ELEMENTS FOR FREQUENCIES FROM 0.2 TO 76 KHZ. THE SELF-IMPEDANCE OF THESE SPHERES AND THE MUTUAL IMPEDANCE BETWEEN THE MESHED AND LONG-BOOM CARBON SPHERES WERE MEASURED. STRONG RESONANCES AT THE HYBRID RESONANCE FREQUENCIES AND ANTI-RESONANCES AT THE GYRO FREQUENCIES WERE USED TO DETERMINE THE DENSITY OF THE SURROUNDING PLASMA. FREQUENCIES UP TO 450 HZ WERE TELEMETERED DIRECTLY, AND SWEEP-FREQUENCY ANALYZERS AND A DIGITAL CORRELATION WERE EMPLOYED TO OBTAIN THE AUTO- AND/OR CROSS-CORRELATION UP TO 77 KHZ WITH SELECTABLE BANDWIDTHS OF 2.5, 5.0, OR 10.0 KHZ.

----- ESA-GEOS 2, GEISS-----

INVESTIGATION NAME- LOW-ENERGY ION COMPOSITION

NSSDC ID- 78-071A-03

INVESTIGATIVE PROGRAM
SCIENCEINVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - J. GEISS	U OF BERNE
PI - H.R. ROSENBAUER	MPI-AERONOMY
OI - P.X. EBERHARDT	U OF BERNE
OI - H. BALSIGER	U OF BERNE
OI - A. GHIEMETTI	U OF BERNE
OI - H. LOIDL	MPI-EXTRATERR PHYS
OI - D.T. YOUNG	U OF BERNE

BRIEF DESCRIPTION

THIS INSTRUMENT (ESA EXPERIMENT NO. S-303) MEASURED THE ENERGY, ANGULAR DISTRIBUTION, AND COMPOSITION OF POSITIVE IONS USING A CYLINDRICAL ELECTROSTATIC ANALYZER (ESA) FOLLOWED BY A CROSSED ELECTRIC AND MAGNETIC FIELD ANALYZER (CFA) TO SELECT THE ENERGY AND VELOCITY. THE ENERGY (PER UNIT CHARGE) RANGED FROM 0.001 TO 17.2 KEV IN 32 STEPS WITH A DELTA E/E OF 0.03 AND A MASS RANGE OF 1 TO 140 U IN 64 LOGARITHMICALLY SPACED STEPS. THERE WAS A THERMAL MODE IN WHICH A RETARDING GRID IN THE ENTRANCE SLIT IS USED FOR ANALYSIS BELOW 0.1 KEV. ALL PARTICLES THAT OVERCAME THIS GRID VOLTAGE WERE ACCELERATED TO 3 KEV BEFORE ENTERING THE ESA IN ITS LOWEST ENERGY STEP, WHERE BOTH THE ESA AND CFA WERE TRANSPARENT. THE DEVICE VIEWS PERPENDICULAR TO THE SPIN OR Z AXIS. FOR LOW-ENERGY IONS, THE ACCEPTANCE ANGLES WERE PLUS OR MINUS 6 DEG IN AZIMUTH AND PLUS OR MINUS 30 DEG IN ELEVATION (REFERENCED TO THE Z AXIS). FOR THE HIGHEST ENERGIES, THESE ANGLES DECREASED TO 3.5 AND 7.1 DEG, RESPECTIVELY. THREE PERCENT OF THE IONS LEAVING THE ESA WERE COUNTED BY A CHANNELTRON. THE REMAINING 97 PERCENT ENTERED THE CFA AND THE OUTPUT WAS DETECTED BY AN ELECTRON MULTIPLIER. THIS SIGNAL WAS PULSE-HEIGHT ANALYZED BY ONE FIXED AND ONE VARIABLE DISCRIMINATOR TO OBTAIN BETTER MASS DISCRIMINATION. THE MAIN PURPOSE OF THIS INVESTIGATION WAS TO IDENTIFY THE SOURCES OF LOW-ENERGY PARTICLES IN THE MAGNETOSPHERE. TIME VARIATIONS OF THE HELIUM/HYDROGEN RATIO, THE DEGREE OF IONIZATION OF HELIUM AND OXYGEN, AND THE ISOTOPIC ABUNDANCE RATIO OF HELIUM 3/HELIUM 4 COULD BE MEASURED TO DETERMINE THESE SOURCES.

----- ESA-GEOS 2, GENDRIN-----

INVESTIGATION NAME- MAGNETIC WAVE FIELDS

NSSDC ID- 78-071A-06

INVESTIGATIVE PROGRAM
SCIENCEINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - R.E. GENDRIN	CNET
OI - J.M. ETCHEO	CNET
OI - E. UNGSTRUP	DANISH SPACE RES INST

BRIEF DESCRIPTION

THE INSTRUMENT USED TWO SETS OF THREE-AXIS SEARCH COIL MAGNETOMETERS, ONE FOR THE ULF/ELF RANGE (0.1 TO 450 HZ) AND ONE FOR THE VLF RANGE (0.3 TO 30 KHZ). EACH SEARCH COIL CONSISTED OF A HIGH-PERMEABILITY MATERIAL WITH A HIGH DENSITY PICK-UP WINDING. EACH SET OF THE THREE COILS WAS BUILT INTO A SINGLE ASSEMBLY AND MOUNTED ON THE LOCKING 3-M BOOMS AT A DISTANCE OF 2 M FROM THE SPACECRAFT. TYPICAL SENSITIVITIES OF THESE SENSORS IN UNITS OF GAMMAS PER SQ ROOT OF HZ, WERE $1.E-1$ AT 0.1 HZ, $2.E-4$ AT 10 HZ, AND ABOUT $3.E-6$ AT 1 KHZ. THESE SENSORS AND SOME ASSOCIATED ELECTRONICS CONSISTING OF (1) A LARGE NUMBER OF CHANNEL-SELECTION SWITCHES, (2) A NUMBER OF

BANDPASS FILTERS, (3) SIX SWEEP-FREQUENCY ANALYZERS (SFA), (4) A DIGITAL CORRELATOR, AND (5) EIGHT STEPPED-GAIN AMPLIFIERS, COMPRISED PART OF THE ESA WAVE EXPERIMENT NO. S-300. THESE COMPONENTS WERE EMPLOYED FOR THE SENSORS DESCRIBED IN 78-071A-07 (PEDERSEN) AND -10 (UNGSTRUP), AND ALSO THE INVESTIGATIONS DESCRIBED IN -05 (PETIT) AND -11 (BEGHIN). SIX ANALOG CHANNELS OF 450 HZ BANDWIDTH AND THE DIGITAL CORRELATOR OUTPUT WERE TRANSMITTED BY THE 95.25 KBS TELEMETRY MODE. THE SFAS COVERED THE FREQUENCY RANGE UP TO 77 KHZ IN 256 PARTLY OVERLAPPING STEPS. THE CORRELATOR PROVIDED AN AUTO-CORRELOGRAM OF 128 POINTS WITHIN 29 MS. ITS BANDWIDTH COULD BE SELECTED TO BE 2.5, 5.0, OR 10.0 KHZ. CROSS-CORRELOGRAM BETWEEN TWO SENSORS COULD BE PROVIDED. THE CORRELATOR ALSO OPERATED IN A TIME-SHARING MODE BETWEEN AUTO- AND CROSS-CORRELATION.

----- ESA-GEOS 2, HULTQVIST-----

INVESTIGATION NAME- LOW-ENERGY ELECTRON AND PROTON PITCH ANGLE DISTRIBUTION

NSSDC ID- 78-071A-04

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - B.K.G.HULTQVIST	KIRUNA GEOPHYS INST
O1 - H. BORG	KIRUNA GEOPHYS INST
O1 - L.A. HOLMGREN	KIRUNA GEOPHYS INST

BRIEF DESCRIPTION

THIS INSTRUMENT (ESA EXPERIMENT NO. S-370) MEASURED THE ENERGY AND PITCH ANGLE DISTRIBUTION OF ELECTRONS AND PROTONS IN THE ENERGY RANGE 0.2 TO 20 KEV WITH EXTENSIVE ANGULAR COVERAGE CONCENTRATED IN THE LOSS CONE REGION. THE PURPOSE OF THE INVESTIGATION WAS TO IMPROVE THE UNDERSTANDING OF AURORAL PARTICLE ACCELERATION AND PRECIPITATION MECHANISMS BY COMPARING NEAR-EQUATORIAL PARTICLE DISTRIBUTIONS WITH COORDINATED GROUND-BASED OBSERVATIONS AT THE FOOT OF THE MAGNETIC FIELD LINE. HIGH TEMPORAL AND SPATIAL RESOLUTION OF THE INSTRUMENT WAS PROVIDED TO STUDY WAVE-PARTICLE INTERACTIONS. THE EXPERIMENT OF WILKEN (78-071A-01) WAS COMPLEMENTARY TO THIS ONE, EXTENDING TO HIGH ENERGY RANGES BOTH ELECTRON AND PROTON OBSERVATIONS. A TOTAL OF 10 CURVED-PLATE ANALYZERS WITH CHANNEL ELECTRON MULTIPLIERS FOR PARTICLE DETECTION WERE USED. ALTHOUGH NORMALLY EIGHT ANALYZERS WERE USED TO DETECT ELECTRONS AND TWO TO DETECT PROTONS, A COMPLEX ARRANGEMENT WITH FOUR SEPARATE HV SUPPLIES ALLOWED INDEPENDENT SWITCHING OF FOUR DETECTOR GROUPS. THE ANALYZING PLATE VOLTAGES COULD OPERATE IN A STEPPING MODE, A SWEEPING MODE, OR A CONSTANT-VOLTAGE MODE. IN ADDITION, THE TIME ACCUMULATION COULD BE VARIED WITH A NOMINAL FRAME DURATION OF 43 MS. HOWEVER, THIS DURATION COULD BE DECREASED BY A FACTOR OF FOUR AT THE EXPENSE OF OBTAINING DATA FROM CERTAIN DETECTORS IN THOSE CASES WHERE FAST TEMPORAL VARIATIONS WERE ENCOUNTERED IN THE LOSS CONE. THE ENERGY INTERVALS IN THE STEPPING MODE CONSISTED OF 32 ENERGY STEPS. THE EIGHT NORMAL ELECTRON ANALYZERS, WITH GEOMETRIC FACTOR (G) OF 3.E-4 SQ CM-SR, CONSISTED OF FOUR NARROW-ANGLE (2 DEG X 2 DEG, DELTA E/E OF 0.11) AND FOUR WIDE-ANGLE (8 DEG X 7.5 DEG, DELTA E/E OF 0.09) DEVICES. THE TWO NORMAL PROTON ANALYZERS HAD DELTA E/E OF 0.13, APERTURE OF 6 DEG X 3 DEG, AND G OF 1.E-3 SQ CM-SR. APERTURE ANGULAR WIDTHS REFER TO ELEVATION AND AZIMUTH, RESPECTIVELY, IN RELATION TO THE SPACECRAFT SPIN AXIS. THIS EXPERIMENT RELIED HEAVILY ON REAL-TIME GROUND COMPUTER CONTROL.

----- ESA-GEOS 2, MARIANI-----

INVESTIGATION NAME- TRIAXIAL FLUXGATE MAGNETOMETER

NSSDC ID- 78-071A-09

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - F. MARIANI	SPACE PLASMA LAB
O1 - M. CANDIDI	CNR, SPACE PLASMA LAB
O1 - D.H. FAIRFIELD	NASA-GSFC

BRIEF DESCRIPTION

A TRIAXIAL FLUXGATE MAGNETOMETER WAS EMPLOYED FOR SIMULTANEOUS MEASUREMENTS OF THE THREE COMPONENTS OF THE MAGNETIC FIELD. THE FREQUENCY RANGE COVERED BY THE INSTRUMENT EXTENDED FROM DC UP TO 5 HZ. IN THE NORMAL ORIENTATION OF THE SATELLITE THE MAIN COMPONENT OF THE FIELD COINCIDED WITH THE Z-AXIS OF THE INSTRUMENT, WHICH WAS ALIGNED WITH THE SPIN AXIS OF THE SATELLITE. THE EXPERIMENT HAD BEEN DESIGNED WITH TWO SENSITIVITY RANGES FOR THE X AND Y COMPONENTS FOR WHICH THE MAGNETIC FIELD COMPONENT WAS ONLY A FRACTION OF THE TOTAL FIELD AND WAS MODULATED BY THE ROTATION OF THE SPACECRAFT. THIS LAST FEATURE MADE THE RANGE SWITCH TECHNIQUE PREFERABLE TO A BIAS OFFSET TECHNIQUE. THE TWO SELECTED SENSITIVITY RANGES WERE PLUS OR MINUS 60 NT (GAMMAS) AND PLUS OR MINUS 180 NT, RESPECTIVELY. IN Z-AXIS, WHERE THE FIELD WAS HIGHER AND NOT MODULATED BY THE SATELLITE ROTATION, A SINGLE SENSITIVITY RANGE OF PLUS OR MINUS 60 NT WAS USED. THE SIGNAL WAS KEPT WITHIN RANGE BY SUPERIMPOSING POSITIVE AND NEGATIVE BIAS LEVELS OF 60 NT EACH, SUCH THAT A RANGE PLUS OR MINUS 480 NT WITH A CONSTANT QUANTIZATION ERROR OF PLUS OR MINUS 0.125 NT USING A 9-BIT

DIGITIZATION WAS OBTAINED. THE NOISE LEVEL OF THE SENSORS WAS COMPARABLE TO THIS QUANTIZATION ERROR.

----- ESA-GEOS 2, MELZNER-----

INVESTIGATION NAME- DC ELECTRIC FIELD AND GRADIENT B ELECTRON BEAM DEFLECTION

NSSDC ID- 78-071A-08

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - F. MELZNER	MPI-EXTRATERR PHYS
O1 - H. VOLK	MPI-NUCLEAR PHYS
O1 - G. METZNER	MPI-EXTRATERR PHYS

BRIEF DESCRIPTION

THE PRIME OBJECTIVE OF THIS INVESTIGATION (ESA EXPERIMENT NO. S-329) WAS THE MEASUREMENT OF THE DC ELECTRIC FIELD IN THE PLANE PERPENDICULAR TO THE LOCAL MAGNETIC FIELD (B). THE INVESTIGATION ALSO MEASURED THE SPATIAL GRADIENT OF B IN THE VICINITY OF THE SPACECRAFT. WITH THIS DATA, A MAPPING OF THE ELECTRIC FIELDS IN THE EQUATORIAL MAGNETOSPHERE LINKED MAGNETICALLY TO THE AURORAL ZONES COULD BE ACHIEVED, AS WELL AS DETERMINING PLASMA CONVECTION AND PARTICLE FLOW WITHIN THE PLASMA SHEET. THE INSTRUMENT CONSISTED OF FOUR ELECTRON GUNS SPACED LOGARITHMICALLY FROM THE ELECTRON DETECTOR. TWO OF THE GUNS WERE MOUNTED ON ONE OF THE 3-M RADIAL BOOMS. THE GUNS WERE USED ONE AT A TIME TO GENERATE AN ELECTRON BEAM OF ABOUT 1.E-8 AMP AND ENERGY ABOUT 1 KEV. BOTH PARAMETERS WERE VARIED BY TELECOMMAND. DEFLECTION PLATES ASSOCIATED WITH EACH GUN RECEIVED A SINUSOIDAL SIGNAL FROM THE MAGNETOMETER INVESTIGATION TO INSURE THAT THE BEAM WAS ALWAYS AT RIGHT ANGLES TO B, IN SPITE OF THE ANGLE OF THE SPIN VECTOR TO B. THE ELECTRON DETECTOR CONSISTED OF DEFLECTION PLATES THAT REMOVED THE ELEVATION CORRECTION GIVEN TO THE BEAM BY THE MAGNETOMETER SIGNAL, A CURVED PLATE ENERGY FILTER, AND A PHOTOMULTIPLIER TUBE. BECAUSE THE MAXIMUM DISPLACEMENT OCCURRED WHEN THE BEAM MADE AN ANGLE OF 0 OR 180 DEG TO THE ELECTRIC FIELD, ALL POSSIBLE DISPLACEMENTS LESS THAN THIS OCCURRED TWICE DURING A SPIN PERIOD. CONSEQUENTLY, THE BEAM SWEEP ACROSS THE DETECTOR TWICE PER SPIN PERIOD, PROVIDED THE MAXIMUM DISPLACEMENT WAS LESS THAN THE DISTANCE BETWEEN THE GUN AND THE DETECTOR. THE VALUES OF THE SPIN ANGLE AT WHICH THE BEAM WAS DETECTED AFTER ONE GYRATION, AND THE DISTANCE BETWEEN THE GUN AND RECEIVER, ALLOWED THE DETERMINATION OF THE ELECTRIC FIELD. A POSSIBLE CONTRIBUTION FROM THE GRADIENT OF B COULD BE DETERMINED BY VARYING THE ENERGY OF THE BEAM. THE INVESTIGATION RELIED ENTIRELY ON REAL-TIME CONTROL BY A GROUND-BASED COMPUTER. IT HAS FOUR BASIC MODES OF OPERATION: A SEARCH MODE, AN ADJUSTMENT MODE, AN OPTIMIZATION MODE, AND A NORMAL MODE. THE SEARCH MODE WAS DESIGNED TO FIND THE SIGNAL AT NOMINAL BEAM PARAMETERS. IF THIS WAS NOT ACHIEVED, THE ADJUSTMENT MODE WAS USED TO VARY THESE PARAMETERS SYSTEMATICALLY. ONCE THE BEAM WAS DETECTED, THE OPTIMIZATION MODE DETERMINED THE BEST COMPROMISE BETWEEN BEAM CURRENT AND RECEIVED SIGNAL QUALITY. THEN THE NORMAL MODE STARTED, WHICH CONSISTED OF A CONTINUOUS MEASUREMENT OF THE ELECTRIC FIELD AND THE GRADIENT OF B, USING THE MOST APPROPRIATE OF THE FOUR GUNS.

----- ESA-GEOS 2, PEDERSEN-----

INVESTIGATION NAME- DC FIELDS BY DOUBLE PROBE

NSSDC ID- 78-071A-07

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - A. PEDERSEN	ESA-ESTEC
O1 - D. JONES	ESA-ESTEC
O1 - K. KNOTT	ESA-ESTEC
O1 - R.J.L.GRAD	ESA-ESTEC

BRIEF DESCRIPTION

THIS INSTRUMENT CONSISTED OF TWO VITREOUS CARBON SPHERES MOUNTED AT THE TIPS OF THE 20-M CABLE BOOMS, WHICH EXTENDED RADially FROM THE SPACECRAFT PERPENDICULAR TO THE SPIN AXIS AND COMPRISED PART OF THE ESA NO. S-300 WAVE EXPERIMENT. THIS INVESTIGATION IS CONCERNED WITH THE DC SINGLE AXIS ELECTRIC FIELD ANALYSIS. THE TWO OUTPUT SIGNALS WERE EVALUATED IN TERMS OF DC ELECTRIC FIELD AND CONDITIONED FOR FURTHER TREATMENT IN THE ANALYSIS OF AC ELECTRIC FIELDS. THE OUTPUT FROM ONE SPHERE WAS SIGNAL CONDITIONED ON A LINEAR SCALE; THE DIFFERENTIAL OUTPUT FROM THE TWO SPHERES WAS COMPRESSED LOGARITHMICALLY. IN ADDITION, THE TWO OUTPUTS WERE PASSED THROUGH 450 HZ TO 77 KHZ FILTERS. THESE FILTERED SIGNALS WERE DIFFERENCED AND ALL THREE SIGNALS MADE AVAILABLE FOR ANALYSIS BY THE SWEEP-FREQUENCY ANALYZERS AND DIGITAL CORRELATOR AS PART OF 78-071A-05 (PETIT), -10 (UNGSTRUP), AND -01 (BEGHIN) INVESTIGATIONS. THE SENSITIVITY OF THIS PROBE WAS ABOUT 1.E-4 V/M AT DC AND 1.E-8 V/M TIMES THE SQUARE ROOT OF HZ.

----- ESA-GEOS 2, PETIT-----

INVESTIGATION NAME- VLF PLASMA RESONANCES

NSSDC ID- 78-071A-05

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - M. PETIT

CNET

BRIEF DESCRIPTION

THIS INVESTIGATION (PART OF ESA EXPERIMENT NO. S-300) UTILIZED THE 20-M BOOMS (NORMAL TO THE SPACECRAFT SPIN AXIS) AS A DIPOLE ANTENNA, AND THE CARBON SPHERES (PART OF 78-071A-07, PEDERSEN) AS THE RECEIVING ELEMENT. FREQUENCIES FROM 0.3 TO 77 KHZ WERE EMPLOYED. ON TRANSMISSION OF A VLF SIGNAL OF LIMITED DURATION, A TRANSIENT SIGNAL WAS OBSERVED FOR A MUCH LONGER PERIOD THAN THE PULSE LENGTH, PROVIDING THE SPECTRUM OF THE TRANSMITTED SIGNAL INCLUDED ONE OF THE RESONANCE FREQUENCIES OF THE PLASMA. THE AMBIENT PLASMA DENSITY WAS INFERRED FROM THE DETERMINATION OF THE RESONANT FREQUENCIES. RECEIVED FREQUENCIES UP TO 450 HZ WERE TELEMETERED DIRECTLY, AND SIX SWEEP-FREQUENCY ANALYZERS AND A DIGITAL CORRELATOR PROVIDED AUTO- AND CROSS-CORRELATIONS UP TO 77 KHZ. BANDWIDTHS OF 2.5, 5.0, OR 10.0 KHZ COULD BE SELECTED FOR THE CORRELATOR.

----- ESA-GEOS 2, UNGSTRUP-----

INVESTIGATION NAME- ELECTRIC WAVE FIELDS

NSSDC ID- 78-071A-10

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - E. UNGSTRUP

DANISH SPACE RES INST

BRIEF DESCRIPTION

THIS INVESTIGATION WAS PART OF THE ESA NO. S-300 WAVE EXPERIMENT AND EMPLOYED THE FOUR MESH SPHERES MOUNTED AT THE END OF THE 2.5-M AXIAL BOOMS. DIFFERENTIAL MEASUREMENTS FROM THESE SENSORS PROVIDED THE THREE VECTOR COMPONENTS OF THE ELECTRIC FIELD. FREQUENCIES FROM 50 HZ TO 77 KHZ WERE ANALYZED WITH THE SWEEP-FREQUENCY ANALYZER AND THE DIGITAL CORRELATOR. FREQUENCIES UP TO 450 HZ WERE TELEMETERED DIRECTLY, AND AUTO- AND/OR CROSS-CORRELATION OF THE SENSOR OUTPUTS UP TO 77 KHZ WERE ACCOMPLISHED WITH SELECTABLE BANDWIDTHS OF 2.5, 5.0, 10.0 KHZ. THE SENSITIVITY OF THE MESH SPHERE PROBES AT 10 KHZ WAS 1.E-6 V/M TIMES THE SQUARE ROOT OF HZ.

----- ESA-GEOS 2, WILKEN-----

INVESTIGATION NAME- ELECTRON AND PROTON PITCH ANGLE
DISTRIBUTION

NSSDC ID- 78-071A-01

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - B. WILKEN
OI - G. PFOTZER (RETIRED)
OI - E. KEPLER
OI - A. KORTH
OI - J. MUENCH

MPI-AERONOMY
MPI-AERONOMY
MPI-AERONOMY
MPI-AERONOMY
MPI-AERONOMY

BRIEF DESCRIPTION

THIS INSTRUMENT (ESA EXPERIMENT NO. S-321) MEASURED THE ENERGY AND PITCH ANGLE DISTRIBUTION OF HIGHER ENERGY ELECTRONS AND PROTONS THAN THAT OF HULTQVIST (78-071A-04), AND WAS COMPLEMENTARY TO THAT INSTRUMENT. THE DETECTOR SYSTEM CONSISTED OF TWO SEPARATE MAGNETIC SPECTROMETERS FOR ELECTRONS WITH TWO PROTON TELESCOPES ASSOCIATED WITH EACH OF THE MAGNETS THAT SERVED TO FOCUS THE ELECTRONS AWAY FROM THE PROTON DETECTORS. THERE WERE FIVE RECTANGULAR SOLID-STATE DETECTORS MOUNTED ALONG THE FOCAL LINE OF EACH SPECTROMETER TO MEASURE THE ELECTRONS. EACH SPECTROMETER COVERED AN ANGULAR APERTURE IN ELEVATION ANGLE (RELATIVE TO THE SPIN AXIS) OF 60 DEG. THE TWO DEFLECTION MAGNETS WERE POSITIONED SO THAT ELEVATION ANGLES (REFERRED TO THE SPIN AXIS) FROM 10 TO 120 DEG. ON 10 DEG CENTERS, WERE COVERED FOR ELECTRONS, GIVING ELEVATION ANGLES OF 23, 46, 83, AND 106 DEG FOR THE PROTON TELESCOPES. THESE TELESCOPES CONSISTED OF A FRONT, SURFACE-BARRIER DETECTOR AND A REAR, SOLID-STATE DETECTOR. ELECTRON ENERGIES FROM 30 TO 200 KEV AND PROTON ENERGIES FROM 0.04 TO 1.4 MEV WERE COVERED. THE EFFECTIVE ANGULAR APERTURE FOR PROTONS WAS 10 DEG X 4 DEG (ELEVATION X AZIMUTH) AND FOR ELECTRONS WAS 6 DEG X 4 DEG. GEOMETRIC FACTORS IN UNITS OF 1.E-4 SQ CM-SR WERE FIVE FOR PROTONS AND ONE FOR ELECTRONS. A 12-CHANNEL PULSE-HEIGHT ANALYZER (PHA) FOR PROTONS COULD BE USED FOR ANY ONE OF THE FOUR FRONT DETECTORS, PROVIDED A FRONT-REAR COINCIDENCE IS DETECTED, AND A 15-CHANNEL PHA CAN BE USED FOR ANY ONE OF THE 10 ELECTRON DETECTORS. THE SINGLES RATE FOR ONE OF THE FOUR PROTON DETECTORS AND THE COINCIDENCE RATE FROM ONE OF THE FOUR

PROTON TELESCOPES COULD BE SELECTED. THERE WERE THREE MODES FOR DATA SELECTION -- MODE 0, INTEGRAL COUNT RATES AND SPECTRAL MEASUREMENTS FOR ALL 14 DETECTORS; MODE 1, INTEGRAL COUNT RATES AND SPECTRAL MEASUREMENTS FOR FOUR DETECTORS - GOOD TIME RESOLUTION OF INTEGRAL RATES; AND MODE 2, INTEGRAL COUNT RATES AND SPECTRAL MEASUREMENTS - GOOD TIME RESOLUTION FOR ENERGY SPECTRA. THE MINIMUM TIME FOR A COMPLETE SPECTRUM WAS 688 MS; THE MINIMUM TIME FOR INTEGRAL FLUX VARIATIONS WAS 43 MS. THE SPECTRAL MEASUREMENTS HAD A RESOLUTION OF $\Delta E/E = 0.35$.

----- ESA-GEOS 2, WRENN-----

INVESTIGATION NAME- THERMAL PLASMA FLOW

NSSDC ID- 78-071A-02

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - G.L. WRENN U COLLEGE LONDON
OI - R.L.F. BOYD U COLLEGE LONDON
OI - K. NORMAN U COLLEGE LONDON
OI - W.J. RAITT UTAH STATE U

BRIEF DESCRIPTION

THE INSTRUMENT (ESA EXPERIMENT NO. S-302) EMPLOYED TWO HEMISPHERICAL ELECTROSTATIC ANALYZERS MOUNTED ON ONE OF THE LOCKING BOOMS FOR THE MEASUREMENT OF ELECTRONS OR PROTONS OVER THE RANGE 0.5 TO 500 EV ARRIVING CLOSE TO PARALLEL AND CLOSE TO PERPENDICULAR TO THE LOCAL MAGNETIC FIELD. THE ENERGY RANGE WAS COVERED IN 64 STEPS WITH A RELATIVE ENERGY RESOLUTION OF 0.11. ONE ANALYZER HAD ITS APERTURE POINTING ALONG THE NEGATIVE (2) SPIN AXIS WITH AN OPENING ANGLE OF 18 DEG X 18 DEG PROVIDING A GEOMETRICAL FACTOR (G) OF 6.E-4 SQ CM-SR. THE OTHER ANALYZER MADE AN ANGLE OF 100 DEG WITH RESPECT TO THE +Z AXIS WITH AN OPENING ANGLE OF 8 DEG X 30 DEG PROVIDING A G OF 5.E-4 SQ CM-SR. BOTH DETECTORS HAD TO MEASURE THE SAME TYPE OF PARTICLES AT THE SAME TIME. THE COLLIMATORS OF THESE INSTRUMENTS COULD BE SET AT ANY VOLTAGE FROM -28 TO +32 V IN STEPS OF 0.1 V TO COMPENSATE FOR THE POTENTIAL DIFFERENCE BETWEEN THE INSTRUMENT AND THE UNDISTURBED PLASMA ENVIRONMENT. THIS VOLTAGE DETERMINED THE SPACECRAFT POTENTIAL.

***** GEOS 3*****

SPACECRAFT COMMON NAME- GEOS 3

ALTERNATE NAMES- GEODETIC SATELLITE-C, GEOS-C

NSSDC ID- 75-027A

LAUNCH DATE- 04/09/75

WEIGHT- 340. KG

LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSTA

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 101.82 MIN
PERIAPSIS- 839. KM ALT

EPOCH DATE- 04/10/75
INCLINATION- 114.96 DEG
APOAPSIS- 853. KM ALT

PERSONNEL

MG - C.J. FINLEY NASA HEADQUARTERS
SC - J.P. MURPHY NASA HEADQUARTERS
PS - H.R. STANLEY NASA-WFC

BRIEF DESCRIPTION

THE SPACECRAFT WAS AN OCTAHEDRON, TOPPED BY A TRUNCATED PYRAMID, WITH A PARABOLIC REFLECTOR FOR A RADAR ALTIMETER ON THE FLAT BOTTOM SIDE. A METAL RIBBON BOOM WITH END MASS EXTENDED UPWARD APPROXIMATELY 6.1 M FROM THE TOP OF THE PYRAMID. PASSIVE LASER RETROREFLECTOR CUBES WERE MOUNTED IN A RING AROUND THE PARABOLIC REFLECTOR WITH THE NORMAL VECTOR FROM EACH CUBE FACING 45 DEG OUTWARD FROM THE EARTH DIRECTION OF THE BOOM AXIS. A TURNSTILE ANTENNA FOR VHF AND UHF FREQUENCIES AND SEPARATE ANTENNAS FOR EARTH-VIEWING, 324-MHZ DOPPLER, C-BAND, AND S-BAND TRANSPONDERS WERE MOUNTED SEPARATELY ON FLAT SURFACES NEXT TO THE PARABOLIC REFLECTOR. THE DIMENSION ACROSS THE FLATS OF THE OCTAHEDRON WAS 1.22 M, AND THE SPACECRAFT WAS 1.11-M HIGH WITH A TOTAL WEIGHT OF 340 KG (748 LB). THE MISSION PROVIDED THE STEPPING STONE BETWEEN THE NATIONAL GEODETIC SATELLITE PROGRAM (NGSP) AND THE EARTH AND OCEAN PHYSICS APPLICATION PROGRAM. IT PROVIDED DATA TO REFINED GEODETIC AND GEOPHYSICAL RESULTS OF THE NGSP AND SERVED AS A TEST FOR NEW SYSTEMS. MISSION OBJECTIVES WERE TO PERFORM A SATELLITE ALTIMETRY EXPERIMENT IN ORBIT, TO SUPPORT FURTHER THE CALIBRATION AND POSITION DETERMINATION OF NASA AND OTHER AGENCY C-BAND RADAR SYSTEMS, AND TO PERFORM A SATELLITE-TO-SATELLITE TRACKING EXPERIMENT WITH THE ATS 6 SPACECRAFT USING AN S-BAND TRANSPONDER SYSTEM. THIS SYSTEM WAS ALSO USED FOR PERIODIC GEOS 3 TELEMETRY DATA RELAY THROUGH ATS 6, TO SUPPORT FURTHER THE INTERCOMPARISON OF TRACKING SYSTEMS, TO INVESTIGATE THE SOLID-EARTH DYNAMIC PHENOMENA THROUGH PRECISION LASER TRACKING, TO REFINED FURTHER ORBIT DETERMINATION TECHNIQUES AND DETERMINE INTERDATUM TIES AND GRAVITY MODELS, AND TO SUPPORT THE CALIBRATION AND POSITION DETERMINATION OF NASA-SDON S-BAND TRACKING STATIONS.

----- GEOS 3, ANDERLE-----
INVESTIGATION NAME- US NAVY DOPPLER SYSTEM
NSSDC ID- 75-027A-05 INVESTIGATIVE PROGRAM
CODE ER
INVESTIGATION DISCIPLINE(S)
NAVIGATION
GEODESY

PERSONNEL
PI - R.J. ANDERLE USN SURFACE WEAPNS CTR

BRIEF DESCRIPTION
THE DOPPLER TECHNIQUE OF TIMING AND MEASURING THE FREQUENCY SHIFT OF RADIO TRANSMISSIONS FROM A MOVING SPACECRAFT WAS USED TO OBTAIN DATA THAT FURTHER ESTABLISHED THE STRUCTURE OF THE EARTH'S GRAVITATIONAL FIELD THROUGH THE COMPARISON OF NEW WITH ESTABLISHED GEODETIC MEASUREMENTS. TWO TRANSMITTERS WERE OPERATED AT FREQUENCIES OF 162 AND 324 MHZ. THE DUAL FREQUENCIES WERE COHERENTLY RELATED AND UTILIZED IN CONJUNCTION WITH GROUND DOPPLER RECEIVING STATIONS TO OBTAIN PRECISION SATELLITE RANGE-RATE DATA. THE DUAL FREQUENCIES WERE GENERATED BY A HIGHLY STABLE OSCILLATOR DRIVING TWO FREQUENCY MULTIPLIERS. BOTH FREQUENCIES WERE USED SIMULTANEOUSLY TO PROVIDE COMPARISON DATA OF THE EFFECT OF THE IONOSPHERE ON THE SIGNALS, WHICH WERE TO CORRECT THE DATA FOR THIS ERROR SOURCE. THIRTEEN OR MORE FIXED GROUND RECEIVING STATIONS OPERATED BY THE U.S. NAVY DOPPLER TRACKING NETWORK (TRANET) AND 12 PORTABLE GEOCEIVERS OPERATED BY THE U.S. ARMY, U.S. NAVY, AND U.S. AIR FORCE -- ALL UNDER THE DIRECTION OF THE DEFENSE MAPPING AGENCY (DMA) -- WERE EXPECTED TO BE IN OPERATION. OBSERVATIONS MADE FROM THREE OR MORE KNOWN STATIONS ALLOWED DEDUCTION OF ORBITAL PARAMETERS. RANGE-RATE DATA FROM EITHER THE FIXED STATIONS OR THE GEOCEIVERS WERE ESTIMATED TO BE ACCURATE WITHIN 0.5 CM/S.

----- GEOS 3, GALICINAO-----
INVESTIGATION NAME- SATELLITE-TO-SATELLITE TRACKING
NSSDC ID- 75-027A-06 INVESTIGATIVE PROGRAM
CODE ER
INVESTIGATION DISCIPLINE(S)
NAVIGATION

PERSONNEL
PI - I.Y. GALICINAO NASA-GSFC

BRIEF DESCRIPTION
THE SATELLITE-TO-SATELLITE TRACKING (SST) SYSTEM USED CONSISTED OF: (1) THE GROUND-BASED APPLICATION TECHNOLOGY SATELLITE RANGING (ATSR) SYSTEM (MODIFIED FOR SATELLITE-TO-SATELLITE TRACKING), (2) THE WIDEBAND COMMUNICATION TRANSPONDER ON THE ATS 6 GEOSYNCHRONOUS SPACECRAFT, AND (3) THE RANGING TRANSPONDER ON THE LOW-ORBITING SATELLITE.

----- GEOS 3, JACKSON-----
INVESTIGATION NAME- C-BAND SYSTEM
NSSDC ID- 75-027A-03 INVESTIGATIVE PROGRAM
CODE ER
INVESTIGATION DISCIPLINE(S)
NAVIGATION

PERSONNEL
PI - E.B. JACKSON NASA-WFC

BRIEF DESCRIPTION
THE C-BAND TRANSPONDER SUBSYSTEM CONSISTED OF TWO TRANSPONDERS, ONE THE GEOS 2 NONCOHERENT TYPE AND THE OTHER A COHERENT C-BAND TRANSPONDER. THE NONCOHERENT TRANSPONDER PROVIDED FOR RANGE AND ANGLE MEASUREMENTS, WHILE THE COHERENT TRANSPONDER PROVIDED FOR BOTH RANGE, RANGE-RATE, AND ANGLE MEASUREMENTS. BOTH TRANSPONDERS RECEIVED SIGNALS AT 5690 MHZ. THE COHERENT TRANSPONDER TRANSMITTED AT 5690 MHZ WHILE THE NONCOHERENT TYPE TRANSMITTED AT 5765 MHZ. EACH C-BAND TRANSPONDER TRANSMITTED ONE PULSE FOR EACH CODED GROUP OF PULSES TRANSMITTED BY A GROUND TRACKING C-BAND RADAR. THE INTERNAL DELAY BETWEEN THE RECEIVED GROUND TRANSMITTED PULSE CODE AND THE TRANSPONDER TRANSMITTED PULSE WAS CALIBRATED PRIOR TO LAUNCH. EACH TRANSPONDER (WHILE OPERATING SEPARATELY OR SIMULTANEOUSLY) OPERATED IN EITHER STANDBY OR OVERRIDE MODE. IN STANDBY, THE RECEIVER BECAME OPERATIONAL AFTER APPROXIMATELY 60 S OF INTERROGATION OR LONG ENOUGH FOR THE OUTPUT TUBE TO WARM UP. IN OVERRIDE, THE OUTPUT TUBE FILAMENT WAS ENERGIZED BY THE EXTERNAL COMMAND AND THE WARM-UP DELAY CIRCUIT BYPASSED AFTER THE TUBE WARMED UP, THUS ALLOWING THE TRANSPONDER TO RESPOND IMMEDIATELY TO INTERROGATION SIGNALS. THIS OVERRIDE MODE REDUCED GROUND COMMAND REQUIREMENTS AND CONSERVED SPACECRAFT POWER.

----- GEOS 3, PURDY-----
INVESTIGATION NAME- RADAR ALTIMETER SYSTEM

NSSDC ID- 75-027A-01 INVESTIGATIVE PROGRAM
CODE ER
INVESTIGATION DISCIPLINE(S)
NAVIGATION
GEODESY

PERSONNEL
PI - C.L. PURDY NASA-WFC

BRIEF DESCRIPTION
THE RADAR-ALTIMETER EXPERIMENT WAS THE HIGHEST PRIORITY EXPERIMENT ON GEOS 3. THE OBJECTIVES WERE TO DETERMINE THE FEASIBILITY AND UTILITY OF A SPACEBORNE RADAR ALTIMETER FOR MAPPING THE TOPOGRAPHY OF THE OCEAN SURFACE WITH AN ABSOLUTE ACCURACY WITHIN 5 M, AND WITH A RELATIVE ACCURACY OF 1 TO 2 M, TO DETERMINE THE FEASIBILITY OF MEASURING THE DEFLECTION OF THE VERTICAL AT SEA, TO DETERMINE THE FEASIBILITY OF MEASURING WAVE HEIGHT, AND TO CONTRIBUTE TO THE TECHNOLOGY LEADING TO A FUTURE OPERATIONAL ALTIMETER-SATELLITE SYSTEM WITH A 10-CM MEASUREMENT CAPABILITY. TO MEET THE EXPERIMENT OBJECTIVES, THE ALTIMETER HAD TWO DISTINCT DATA GATHERING MODES -- A LONG-PULSE ALTIMETRY DATA MODE AND A SHORT-PULSE MODE. PERFORMANCE CAPABILITIES AND OPERATING CHARACTERISTICS OF THE ALTIMETER DIFFERED FOR THE TWO MODES. BOTH MODES OPERATED ON A 13.9-GHZ FREQUENCY, USED A PARABOLIC ANTENNA, HAD A MAXIMUM RANGE ACQUISITION TIME OF 6 S, AND HAD AN ALTITUDE GRANULARITY OF PLUS OR MINUS 0.2 M. DIFFERING CHARACTERISTICS WERE: (1) ALTITUDE DATA RATE FOR LONG PULSE WAS 2 READING/S AND FOR SHORT PULSE 6 READING/S, AND (2) INPUT POWER FOR LONG PULSE WAS 50 W, FOR SHORT PULSE 100 W. THE GEOS 3 RADAR ALTIMETER HAD SEVERAL FEATURES IN COMMON WITH THE ALTIMETER USED ON THE SKYLAB SATELLITE, BUT HAD ADVANTAGES OVER THE SKYLAB ALTIMETER BECAUSE OF IMPROVED ACCURACY AND ABILITY TO OPERATE OVER EXTENDED AREAS FOR GREATER PERIODS OF TIME, THEREBY PROVIDING THE CAPABILITY TO EXAMINE THE EARTH OVER LONGER ARCS AND OBSERVE EXTENSIVE OCEAN AREAS.

----- GEOS 3, SALZBERG-----
INVESTIGATION NAME- S-BAND TRACKING SYSTEM
NSSDC ID- 75-027A-02 INVESTIGATIVE PROGRAM
CODE ER
INVESTIGATION DISCIPLINE(S)
NAVIGATION

PERSONNEL
PI - I.M. SALZBERG NASA-GSFC

BRIEF DESCRIPTION
THE S-BAND TRANSPONDER SUBSYSTEM PROVIDED METRIC TRACKING DATA (RANGE, RANGE-RATE). IT TRANSMITTED TELEMETRY DATA BUT DID NOT RECEIVE COMMANDS. THE TRANSPONDER OPERATED IN THE FOLLOWING THREE MODES: (1) SATELLITE-TO-SATELLITE TRACKING (SST) FROM THE ROSMAN OR EUROPEAN ATS GROUND STATIONS THROUGH ATS 6 TO GEOS 3 AND BACK, (2) DIRECT USB (DOPPLER ONLY) GROUND STATION TRACKING OF GEOS 3, AND (3) DIRECT GRARR GROUND STATION TRACKING OF GEOS 3. THE TRANSPONDER SUBSYSTEM CONSISTED OF A SINGLE-CHANNEL TRANSPONDER, A POWER AMPLIFIER, A DIPLEXER, AND AN EARTH-VIEWING AND ATS-VIEWING ANTENNA SYSTEM. THE ANTENNAS WERE SELECTABLE BY GROUND COMMAND. THE EARTH-VIEWING ANTENNA FOR DIRECT TRACKING WITH THE USB AND GRARR GROUND STATIONS HAD APPROXIMATELY HEMISPHERICAL COVERAGE AND A MINIMUM OF 0 DB GAIN WITHIN 60 DEG OF THE SPACECRAFT Z AXIS. THE SST ANTENNA SYSTEM CONSISTED OF AN IN-TRACK ARRAY THAT PROVIDED A 3-DB GAIN IN THE DIRECTION OF ATS FOR GEOS ASCENDING AND DESCENDING NODE PASSES, WHICH CROSSED THE EQUATOR WITHIN PLUS OR MINUS 26 DEGREES OF THE ATS SUBSATELLITE POINT. IN THE SST OPERATION MODE, THE INTERROGATION SIGNAL WAS FIRST TRANSMITTED AT C-BAND BY THE ATS GROUND STATION TO THE ATS 6 SPACECRAFT. ATS 6 INSTRUMENTATION COHERENTLY ALTERED THE SIGNAL, MAKING IT COMPATIBLE WITH THE INPUT FREQUENCY (2069.1125 MHZ) OF THE S-BAND TRANSPONDER ON GEOS 3, AND TRANSMITTED THE SIGNAL TO GEOS 3. GEOS 3 THEN, AFTER TRANSLATING THE RECEIVED SIGNAL, RETRANSMITTED IT TO ATS 6 AS IF ATS 6 WERE ANOTHER GROUND STATION. ATS 6 THEN RETRANSMITTED THE SIGNAL TO THE ATS GROUND STATION AT C-BAND. RANGE SUM AND RANGE-RATE SUM WERE OBTAINED BY COMPARING THE INTERROGATION AND RESPONSE SIGNALS. THE S-BAND ON GEOS 3 WAS ALSO TRACKED BY THE USB AND GRARR STDN STATIONS. CARRIER FREQUENCIES (2069.1125 MHZ UP AND 2247 MHZ DOWN) WERE IDENTICAL TO THOSE OF THE SST MODE. COHERENT GRARR TRACKING WAS ACCOMPLISHED VIA STANDARD GRARR RANGING SIDE TONES. USB TRACKING CONSISTED ONLY OF COHERENT-CARRIER DOPPLER TRACKING. THE S-BAND TRANSPONDER WAS A SINGLE-CHANNEL TRANSPONDER; THEREFORE, SIMULTANEOUS OPERATION WAS NOT POSSIBLE.

----- GEOS 3, STEPHANIDES-----
INVESTIGATION NAME- LASER CUBE SYSTEM
NSSDC ID- 75-027A-04 INVESTIGATIVE PROGRAM
CODE ER
INVESTIGATION DISCIPLINE(S)
NAVIGATION
GEODESY

PERSONNEL
PI - C.C. STEPHANIDES

NASA-GSFC

BRIEF DESCRIPTION

LASER CORNER REFLECTORS, COMPOSED OF 270 (MINIMUM) 35-MM CUBES, AND GROUND-BASED LASER SYSTEMS WERE USED TO OBTAIN PRECISE SATELLITE TRACKING INFORMATION. THE APPLIED PHYSICS LABORATORY PROVIDED THE LASER CUBE REFLECTOR PANELS. THE CUBES WERE CONFIGURED ON THE LATERAL SURFACE OF A CONIC FRUSTUM, WITH THE LATERAL SURFACE OF THE FRUSTUM ADJOINING THE BOTTOM, EARTH-ORIENTED SURFACE OF THE SPACECRAFT AT A 45-DEG ANGLE. THE BASE OF THE FRUSTUM MEASURED APPROXIMATELY 0.9 METERS IN DIAM. WHEN ILLUMINATED BY A LASER LIGHT PULSE FROM THE GROUND, EACH RETROREFLECTOR CUBE IN THE ARRAY REFLECTED THE LIGHT RAY BACK TO A SPECIAL TELESCOPE RECEIVER ON THE GROUND. THE REFLECTED LIGHT WAS PICKED UP BY THE TELESCOPE AND THE OPTICAL IMPULSES CONVERTED TO AN ELECTRICAL SIGNAL. A DIGITAL COUNTER RECORDED THE TIME WHEN THE LIGHT BEAM WAS RETURNED TO THE GROUND. THE TOTAL TRAVEL TIME OF THE LIGHT PULSES, FROM GROUND TO SATELLITE AND BACK TO THE GROUND, MEASURED THE DISTANCE TO THE SATELLITE, THUS FORMING THE BASIS OF THE SATELLITE OPTICAL LASER SYSTEM. THE FOLLOWING OBSERVATIONAL SYSTEMS ACQUIRED THE NECESSARY DATA -- NASA/WALLOPS LASER RANGING SYSTEMS, SAO LASER RANGING SYSTEMS, GSFC LASER RANGING SYSTEMS, AND OTHER NATIONAL AND INTERNATIONAL LASER STATIONS AS DETERMINED.

***** GMS*****

SPACECRAFT COMMON NAME- GMS
ALTERNATE NAMES- GEOSTATION.METEOROL.SAT.

NSSDC ID- 77-065A

LAUNCH DATE- 07/14/77 WEIGHT- 647. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY

JAPAN NASDA
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1429.4 MIN
PERIAPSIS- 35531. KM ALT

EPOCH DATE- 07/15/77
INCLINATION- 0.0 DEG
APOAPSIS- 35779. KM ALT

PERSONNEL

PM - N. KODAIRA NATL SATELL DEV AGCY
PS - JMA STAFF JAPANESE METEOROL AGCY

BRIEF DESCRIPTION

THE GEOSTATIONARY METEOROLOGICAL SATELLITE (GMS) WAS JAPAN'S CONTRIBUTION TO THE INTERNATIONAL GARP (GLOBAL ATMOSPHERIC RESEARCH PROGRAM). ONE MAJOR OBJECTIVE OF GARP WAS TO OBTAIN SYNOPTIC GLOBAL METEOROLOGICAL DATA SETS FOR ONE YEAR'S DURATION (TO INCLUDE TWO OPTIMIZED OBSERVING PERIODS OF A FEW WEEKS EACH). THESE DATA SERVED AS RAW MATERIAL TO OPTIMIZE COMPUTER MODELS FOR METEOROLOGICAL PREDICTION. IT WAS HOPED THAT DETERMINATION COULD BE MADE OF THE TIME LIMITATION FOR SHORT-TERM MODELING. THIS SPACECRAFT WAS ROUGHLY CYLINDRICAL WITH A HEIGHT OF 345 CM AND DIAMETER OF 216 CM. THE CYLINDRICAL SURFACE WAS COVERED WITH SOLAR CELLS WHICH COULD PROVIDE 225 W. THE SATELLITE WAS SPIN-STABILIZED WITH A DESPUN EARTH-POINTING ANTENNA. THE SATELLITE WAS POSITIONED NEAR 140 DEG E AND DESIGNED TO OPERATE FOR 5 YEARS.

----- GMS, JMA STAFF-----

INVESTIGATION NAME- VISIBLE AND INFRARED SPIN-SCAN
RADIOMETER (VISSR)

NSSDC ID- 77-065A-01 INVESTIGATIVE PROGRAM
APPLICATIONS SATELLITE

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - JMA STAFF JAPANESE METEOROL AGCY

BRIEF DESCRIPTION

THE VISIBLE IR SPIN-SCAN RADIOMETER (VISSR) WAS SIMILAR TO VISSR EXPERIMENTS ON OTHER GARP (GLOBAL ATMOSPHERIC RESEARCH PROGRAM) SATELLITES SUCH AS GOES 1. IT MADE BOTH NIGHT (IR 10.5 TO 12.5 MICROMETERS) AND DAY IR, PLUS VISIBLE (.5 TO .75 MICROMETERS) PHOTOMETRIC OBSERVATIONS OF THE SUBSATELLITE AREA AT 30 MIN INTERVALS. REAL-TIME TRANSMISSION WAS AVAILABLE TO THE DATA ACQUISITION STATION IN JAPAN, WITH ADDITIONAL DATA TRANSMISSION TO OTHER METEOROLOGICAL USERS AS NEEDED.

----- GMS, JMA STAFF-----

INVESTIGATION NAME- WEATHER COMMUNICATIONS FACILITY

NSSDC ID- 77-065A-03 INVESTIGATIVE PROGRAM
APPLICATIONS SATELLITE

INVESTIGATION DISCIPLINE(S)
COMMUNICATIONS
METEOROLOGY

PERSONNEL
PI - JMA STAFF

JAPANESE METEOROL AGCY

BRIEF DESCRIPTION

THE GMS INCLUDED A COMMUNICATIONS FACILITY. THE OBJECTIVES OF THIS EQUIPMENT WERE (1) TO COLLECT AND RELAY WEATHER OBSERVATIONS FROM REMOTE STATIONS, INCLUDING BUOYS, SHIPS, AND UNMANNED STATIONS, AND (2) TO TRANSMIT WEATHER INFORMATION AND ANALYSES FROM THE CENTRAL WEATHER FACILITY TO OTHER WEATHER STATIONS.

----- GMS, KOHNO-----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR (SEM)

NSSDC ID- 77-065A-02 INVESTIGATIVE PROGRAM
APPLICATIONS SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - T. KOHNO METEOROL RES INST

BRIEF DESCRIPTION

THE SPACE ENVIRONMENT MONITOR (SEM) EXPERIMENT OBSERVED THE IN SITU CHARGED PARTICLE ENVIRONMENT. SOLAR PROTONS (1 TO 500 MEV), ALPHA PARTICLES (8 TO 390 MEV) AND SOLAR ELECTRONS (GREATER THAN 2 MEV) WERE DISCRIMINATED, AND THEIR RESPECTIVE ENERGIES MONITORED BY MEANS OF A NUMBER OF SOLID-STATE DETECTORS.

***** GOES 1*****

SPACECRAFT COMMON NAME- GOES 1
ALTERNATE NAMES- SMS-C, GOES-A
GOES-1

NSSDC ID- 75-100A

LAUNCH DATE- 10/16/75 WEIGHT- 631. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY

UNITED STATES NOAA-NESS
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1412.0 MIN
PERIAPSIS- 34165. KM ALT

EPOCH DATE- 10/17/75
INCLINATION- 1.0 DEG
APOAPSIS- 36458. KM ALT

PERSONNEL

MG - A.J. CERVENKA NASA HEADQUARTERS
PM - R.H. PICKARD NASA-GSFC
PS - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION

GOES 1 (SMS-C) WAS A NASA-DEVELOPED, NOAA-OPERATED SPACECRAFT. THE SPIN-STABILIZED, EARTH-SYNCHRONOUS SPACECRAFT CARRIED (1) A VISIBLE INFRARED, SPIN SCAN RADIOMETER (VISSR) TO PROVIDE HIGH-QUALITY DAY AND NIGHT CLOUDCOVER DATA AND TO TAKE RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, (2) A METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM TO RELAY PROCESSED DATA FROM CENTRAL WEATHER FACILITIES TO SMALL APT-EQUIPPED REGIONAL STATIONS AND TO COLLECT AND RETRANSMIT DATA FROM REMOTELY LOCATED EARTH-BASED PLATFORMS, AND (3) A SPACE ENVIRONMENT MONITOR (SEM) SYSTEM TO MEASURE PROTON, ELECTRON, AND SOLAR X-RAY FLUXES AND MAGNETIC FIELDS. THE CYLINDRICALLY SHAPED SPACECRAFT MEASURED 190.5 CM IN DIAMETER AND 230 CM IN LENGTH, EXCLUSIVE OF A MAGNETOMETER THAT EXTENDED AN ADDITIONAL 83 CM BEYOND THE CYLINDER SHELL. THE PRIMARY STRUCTURAL MEMBERS WERE A HONEYCOMBED EQUIPMENT SHELF AND THRUST TUBE. THE VISSR TELESCOPE WAS MOUNTED ON THE EQUIPMENT SHELF AND VIEWED THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDED RADIALLY FROM THE THRUST TUBE AND WAS AFFIXED TO THE SOLAR PANELS, WHICH FORMED THE OUTER WALLS OF THE SPACECRAFT AND PROVIDED THE PRIMARY SOURCE OF ELECTRICAL POWER. LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE THRUST TUBE AND THE SOLAR PANELS WERE STATIONKEEPING AND DYNAMICS CONTROL EQUIPMENT, BATTERIES, AND MOST OF THE SEM EQUIPMENT. PROPER SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) WERE MAINTAINED BY TWO SEPARATE SETS OF JET THRUSTERS MOUNTED AROUND THE SPACECRAFT'S EQUATOR AND ACTIVATED BY GROUND COMMAND. THE SPACECRAFT USED BOTH UHF-BAND AND S-BAND FREQUENCIES IN ITS TELEMETRY AND COMMAND SUBSYSTEM. A LOW-POWER VHF TRANSPONDER PROVIDED TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVED AS A BACKUP FOR THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT HAD ATTAINED SYNCHRONOUS ORBIT. ON DECEMBER 1, 1978 RESPONSIBILITY FOR GOES 1 WAS TURNED OVER TO ESA WHO USED IT AS PART OF GARP. IT WAS STATIONED OVER THE INDIAN OCEAN AND CONTROLLED BY ESOC IN DARMSTADT, FRG.

----- GOES 1, NESS STAFF-----

INVESTIGATION NAME- VISIBLE-INFRARED SPIN-SCAN RADIOMETER
(VISSR)

NSSDC ID- 75-100A-01

INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - NESS STAFF NOAA-NESS
OI - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION

THE VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR) FLOWN ON GOES 1 PROVIDED DAY/NIGHT OBSERVATIONS OF CLOUDCOVER AND EARTH/CLOUD RADIANCE TEMPERATURE MEASUREMENTS FROM A SYNCHRONOUS, SPIN-STABILIZED, GEOSTATIONARY SATELLITE FOR USE IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE TWO-CHANNEL INSTRUMENT WAS ABLE TO TAKE BOTH FULL AND PARTIAL PICTURES OF THE EARTH'S DISK. THE INFRARED CHANNEL (10.5 TO 12.6 MICROMETERS) AND THE VISIBLE CHANNEL (0.55 TO 0.70 MICROMETER) USED A COMMON OPTICS SYSTEM. INCOMING RADIATION WAS RECEIVED BY AN ELLIPTICALLY-SHAPED SCAN MIRROR AND COLLECTED BY A RITCHEY-CRETEN OPTICAL SYSTEM. THE SCAN MIRROR WAS SET AT A NOMINAL ANGLE OF 45 DEG TO THE VISSR OPTICAL AXIS, WHICH WAS ALIGNED PARALLEL TO THE SPIN AXIS OF THE SPACECRAFT. THE SPINNING MOTION OF THE SPACECRAFT (APPROXIMATELY 100 RPM) PROVIDED A WEST-TO-EAST SCAN MOTION WHEN THE SPIN AXIS OF THE SPACECRAFT WAS ORIENTED PARALLEL WITH THE EARTH'S AXIS. THE LATITUDINAL SCAN WAS ACCOMPLISHED BY SEQUENTIALLY TILTING THE SCANNING MIRROR NORTH TO SOUTH AT THE COMPLETION OF EACH SPIN. A FULL PICTURE TOOK 18.2 MIN TO COMPLETE AND ABOUT 2 MIN TO RETRACE. DURING EACH SCAN, THE FIELD OF VIEW ON THE EARTH WAS SWEEPED BY A LINEAR ARRAY OF EIGHT VISIBLE-SPECTRUM DETECTORS, EACH WITH A GROUND RESOLUTION OF 0.9 KM AT ZERO NAIR ANGLE. A MERCURY-CADMIUM TELLURIDE DETECTOR SENSED THE INFRARED PORTION OF THE SPECTRUM WITH A HORIZONTAL RESOLUTION OF APPROXIMATELY 8 KM AT ZERO NAIR ANGLE. THE INFRARED PORTION OF THE DETECTOR MEASURED RADIANCE TEMPERATURES BETWEEN 180 AND 315 K WITH A PROPOSED SENSITIVITY BETWEEN 0.4 AND 1.4 K. THE VISSR OUTPUT WAS DIGITIZED AND TRANSMITTED TO THE NATIONAL OCEANOGRAPHIC AND ATMOSPHERIC ADMINISTRATION (NOAA) COMMAND DATA ACQUISITION STATION (CDA), WOLLOPS ISLAND, VA. THERE THE SIGNAL WAS FED INTO A 'LINE STRETCHER' WHERE IT WAS STORED AND TIME-STRETCHED FOR TRANSMISSION BACK TO THE SATELLITE AT REDUCED BANDWIDTH FOR RE-BROADCAST TO DATA UTILIZATION STATIONS (DUS). THE VISSR DATA, AS WITH ALL OPERATIONAL TYPE DATA, WERE HANDLED BY NOAA AND THE MAJORITY OF DATA WERE ARCHIVED BY THE ENVIRONMENTAL DATA SERVICE, SATELLITE DATA SERVICE BRANCH, SUITLAND, MD.

----- GOES 1, NESS STAFF -----

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM

NSSDC ID- 75-100A-05

INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM WAS AN EXPERIMENTAL COMMUNICATIONS AND DATA HANDLING SYSTEM DESIGNED TO RECEIVE AND PROCESS METEOROLOGICAL DATA COLLECTED FROM REMOTELY LOCATED EARTH-BASED DATA COLLECTION (OBSERVATION) PLATFORMS (DCP). THE COLLECTED DATA WERE RETRANSMITTED FROM THE SATELLITE TO SMALL, GROUND-BASED, REGIONAL DATA UTILIZATION CENTERS. DATA FROM UP TO 10,000 DCP STATIONS WERE HANDLED BY THE SYSTEM. THE SYSTEM ALSO ALLOWED FOR THE RETRANSMISSION OF NARROW-BAND (WIFAX TYPE) DATA FROM CENTRALIZED WEATHER FACILITIES TO SMALL, GROUND-BASED APT RECEIVER STATIONS. THIS COMMUNICATIONS SYSTEM OPERATED ON S-BAND FREQUENCIES. THE MINIMUM DATA COLLECTION SYSTEM FOR ONE SMALL METEOROLOGICAL SATELLITE CONSISTED OF APPROXIMATELY 3500 DCP STATIONS FOR CONTACT IN A 6-H PERIOD. THE TOTAL AMOUNT OF DATA COLLECTED DURING THE 6-H PERIOD WAS BETWEEN 350K AND 600K BITS, DEPENDING ON THE CODING TECHNIQUES. DATA RECEIVED FROM INDIVIDUAL STATIONS VARIED FROM 50 TO 3000 BITS, DEPENDING ON THE TYPES AND VARIETIES OF SENSORS USED AT AN INDIVIDUAL DCP STATION.

----- GOES 1, WILLIAMS -----

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR

NSSDC ID- 75-100A-02

INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS NOAA-ERL
OI - H.H. SAUER NOAA-ERL

BRIEF DESCRIPTION

A NUMBER OF SEPARATE SILICON SOLID-STATE DETECTORS, EACH HAVING A TAILORED MODERATOR THICKNESS AND A SEPARATE ELECTRONICS UNIT FOR PULSE AMPLIFICATION AND PULSE-HEIGHT DISCRIMINATION, WERE USED TO OBTAIN PARTICLE-TYPE/ENERGY MEASUREMENTS. SEVEN CHANNELS MEASURED PROTONS IN THE RANGE 1 TO 50 MEV. SIX CHANNELS MEASURED ALPHA PARTICLES IN THE RANGE 4 TO 400 MEV. ONE CHANNEL MEASURED ELECTRONS GREATER THAN 2.8 MEV.

----- GOES 1, WILLIAMS -----

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSSDC ID- 75-100A-03

INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - D.J. WILLIAMS NOAA-ERL
OI - R.F. DONNELLY NOAA-ERL

BRIEF DESCRIPTION

THE X-RAY COUNTER WAS COMPOSED OF A COLLIMATOR, TWO IONIZATION CHAMBERS, AND TWO ELECTROMETERS. A SMALL ANGULAR APERTURE WAS CHOSEN FOR THE TELESCOPE COLLIMATOR, WHICH WAS MOUNTED SO THAT THE DECLINATION OF ITS AXIS COULD BE CONTROLLED BY GROUND COMMAND TO INSURE THAT THE SUN WAS VIEWED BY THE TELESCOPE ONCE DURING EVERY VEHICLE ROTATION. ONE ION CHAMBER WAS FILLED WITH ARGON AT 1 ATM FOR DETECTION OF 1- TO 8-A X RAYS AND HAD A 1.27 E-4M BERYLLIUM WINDOW TO EXCLUDE X RAYS OF LONGER WAVELENGTHS. THE OTHER CHAMBER WAS FILLED WITH XENON AT 1.5 TO 2 ATM AND HAD A 1.27 E-3M BERYLLIUM WINDOW FOR MEASUREMENTS OF X RAYS IN THE WAVELENGTH RANGE 0.5- TO 3-A.

----- GOES 1, WILLIAMS -----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- 75-100A-04

INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - D.J. WILLIAMS NOAA-ERL
OI - J.N. BARFIELD NOAA-ERL

BRIEF DESCRIPTION

A SHORT BOOM DEPLOYED (ABOUT .61 M) BIAXIAL, CLOSED-LOOP, FLUXGATE MAGNETOMETER WITH ONE SENSOR ALIGNED PARALLEL TO THE SPACECRAFT SPIN AXIS AND THE OTHER PERPENDICULAR TO THIS AXIS MEASURED THE MAGNETIC FIELD AT SYNCHRONOUS ALTITUDE. EACH SENSOR HAD A SELECTABLE RANGE (+50, 100, 200, OR 400 NT), AN OFFSET FIELD CAPABILITY (PLUS OR MINUS 1200 NT IN 40-NT STEPS), AND AN IN-FLIGHT CALIBRATION CAPABILITY.

***** GOES 2 *****

SPACECRAFT COMMON NAME- GOES 2

ALTERNATE NAMES- GOES-B

NSSDC ID- 77-048A

LAUNCH DATE- 06/16/77 WEIGHT- 294. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY

UNITED STATES NOAA-NESS
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC EPOCH DATE- 06/21/77
ORBIT PERIOD- 1436. MIN INCLINATION- 0.88 DEG
PERIAPSIS- 35266. KM ALT APOAPSIS- 36304. KM ALT

PERSONNEL

MG - A.J. CERVENKA NASA HEADQUARTERS
PM - R.H. PICKARD NASA-GSFC
PS - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION

GOES 2 WAS A NASA-DEVELOPED, NOAA-OPERATED SPACECRAFT. THE SPIN-STABILIZED, EARTH-SYNCHRONOUS SPACECRAFT CARRIED (1) A VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR) TO PROVIDE HIGH-QUALITY DAY/NIGHT CLOUDCOVER DATA AND TO TAKE RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, (2) A METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM TO RELAY PROCESSED DATA FROM CENTRAL WEATHER FACILITIES TO SMALL APT-EQUIPPED REGIONAL STATIONS AND TO COLLECT AND RETRANSMIT DATA FROM REMOTELY LOCATED EARTH-BASED PLATFORMS, AND (3) A SPACE ENVIRONMENT MONITOR (SEM) SYSTEM TO MEASURE PROTON, ELECTRON, AND SOLAR X-RAY FLUXES AND MAGNETIC FIELDS. THE CYLINDRICALLY-SHAPED SPACECRAFT MEASURED 190.5 CM IN DIAM AND 230 CM IN LENGTH, EXCLUSIVE OF A MAGNETOMETER THAT EXTENDED AN ADDITIONAL 83 CM BEYOND THE CYLINDER SHELL. THE PRIMARY STRUCTURAL MEMBERS WERE A HONEYCOMBED EQUIPMENT SHELF AND THRUST TUBE. THE VISSR TELESCOPE WAS MOUNTED ON THE EQUIPMENT

SHELF AND VIEWED THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDED RADIALLY OUT FROM THE THRUST TUBE AND WAS AFFIXED TO THE SOLAR PANELS, WHICH FORMED THE OUTER WALLS OF THE SPACECRAFT AND PROVIDED THE PRIMARY SOURCE OF ELECTRICAL POWER. LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE THRUST TUBE AND THE SOLAR PANELS WERE STATIONKEEPING AND DYNAMICS CONTROL EQUIPMENT, BATTERIES, AND MOST OF THE SEM EQUIPMENT. PROPER SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) WERE MAINTAINED BY TWO SEPARATE SETS OF JET THRUSTERS MOUNTED AROUND THE SPACECRAFT'S EQUATOR AND ACTIVATED BY GROUND COMMAND. THE SPACECRAFT USED BOTH UHF-BAND AND S-BAND FREQUENCIES IN ITS TELEMETRY AND COMMAND SUBSYSTEM. A LOW-POWER VHF TRANSPONDER PROVIDED TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVED AS A BACKUP FOR THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT ATTAINED SYNCHRONOUS ORBIT.

----- GOES 2, NESS STAFF-----

INVESTIGATION NAME- VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR)

NSSDC ID- 77-048A-01 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - NESS STAFF NOAA-NESS
OI - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION

THE VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR) FLOWN ON GOES 2 WAS CAPABLE OF PROVIDING BOTH DAY AND NIGHT OBSERVATIONS OF CLOUD COVER AND EARTH/CLOUD RADIANCE TEMPERATURE MEASUREMENTS FROM A SYNCHRONOUS, SPIN-STABILIZED, GEOSTATIONARY SATELLITE FOR USE IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE TWO-CHANNEL INSTRUMENT WAS ABLE TO TAKE BOTH FULL AND PARTIAL PICTURES OF THE EARTH'S DISK. BOTH THE INFRARED CHANNEL (10.5 TO 12.5 MICROMETERS) AND THE VISIBLE CHANNEL (0.55 TO 0.75 MICROMETERS) USED A COMMON OPTICS SYSTEM. INCOMING RADIATION WAS RECEIVED BY AN ELLIPTICALLY-SHAPED SCAN MIRROR AND COLLECTED BY A RICHEY-CHRETIEN OPTICAL SYSTEM. THE SCAN MIRROR WAS SET AT A NOMINAL ANGLE OF 45 DEG TO THE VISSR OPTICAL AXIS, WHICH WAS ALIGNED PARALLEL TO THE SPIN AXIS OF THE SPACECRAFT. THE SPINNING MOTION OF THE SPACECRAFT (APPROXIMATELY 100 RPM) PROVIDED A WEST-TO-EAST SCAN MOTION WHEN THE SPIN AXIS OF THE SPACECRAFT WAS ORIENTED PARALLEL WITH THE EARTH'S AXIS. THE LATITUDINAL SCAN WAS ACCOMPLISHED BY SEQUENTIALLY TILTING THE SCANNING MIRROR NORTH TO SOUTH AT THE COMPLETION OF EACH SPIN. A FULL PICTURE TOOK 18.2 MIN TO COMPLETE AND ABOUT 2 MIN TO RETRACE. DURING EACH SCAN, EIGHT VISIBLE-SPECTRUM DETECTORS SWEEPED THE EARTH, WITH A GROUND RESOLUTION OF 0.9 KM AT ZERO NADIR ANGLE. A MERCURY-CADMIUM TELLURIDE DETECTOR SENSED THE INFRARED PORTION OF THE SPECTRUM WITH A HORIZONTAL RESOLUTION OF APPROXIMATELY 9 KM AT ZERO NADIR ANGLE. THE INFRARED PORTION OF THE DETECTOR MEASURED RADIANCE TEMPERATURES BETWEEN 180 AND 315 DEG K WITH A PROPOSED SENSITIVITY BETWEEN 0.4 AND 1.4 K. THE VISSR OUTPUT WAS DIGITIZED AND TRANSMITTED TO THE NOAA COMMAND DATA ACQUISITION STATION, WALLOPS ISLAND, VA. THERE THE SIGNAL WAS FED INTO A 'LINE STRETCHER,' WHERE IT WAS STORED AND TIME-STRETCHED FOR TRANSMISSION BACK TO THE SATELLITE AT REDUCED BANDWIDTH FOR REBROADCAST TO APT USER STATIONS. AS WITH ALL OPERATIONAL TYPE DATA, THE VISSR DATA WERE HANDLED BY NOAA AND EVENTUALLY SENT TO THE NATIONAL CLIMATIC CENTER AT ASHEVILLE, NORTH CAROLINA, FOR ARCHIVING.

----- GOES 2, NESS STAFF-----

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM

NSSDC ID- 77-048A-05 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM WAS AN EXPERIMENTAL COMMUNICATIONS AND DATA HANDLING SYSTEM DESIGNED TO RECEIVE AND PROCESS METEOROLOGICAL DATA COLLECTED FROM REMOTELY LOCATED EARTH-BASED DATA COLLECTION (OBSERVATION) PLATFORMS (DCP). THE COLLECTED DATA WERE RETRANSMITTED FROM THE SATELLITE TO SMALL, GROUND-BASED, REGIONAL DATA UTILIZATION CENTERS. DATA FROM UP TO 10,000 DCP STATIONS COULD BE HANDLED BY THE SYSTEM. THE SYSTEM ALSO ALLOWED FOR THE RETRANSMISSION OF NARROW-BAND (WEFAX TYPE) DATA FROM CENTRALIZED WEATHER FACILITIES TO EXISTING SMALL, GROUND-BASED APT RECEIVING STATIONS. THIS COMMUNICATIONS SYSTEM OPERATED ON S-BAND FREQUENCIES. THE MINIMUM DATA COLLECTION SYSTEM FOR ONE SMALL METEOROLOGICAL SATELLITE CONSISTED OF APPROXIMATELY 3500 DCP STATIONS TO BE CONTACTED IN A 6-H PERIOD. THE TOTAL AMOUNT OF DATA COLLECTED DURING THE 6-H PERIOD WAS BETWEEN 350K AND 600K BITS, DEPENDING ON THE CODING TECHNIQUES. DATA RECEIVED FROM INDIVIDUAL STATIONS VARIED FROM 50 TO 3000 BITS, DEPENDING ON THE TYPE AND VARIETY OF SENSORS USED AT AN INDIVIDUAL DCP STATION.

----- GOES 2, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR

NSSDC ID- 77-048A-02 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS NOAA-ERL

BRIEF DESCRIPTION

A NUMBER OF SEPARATE SILICON SOLID-STATE DETECTORS, EACH WITH A TAILORED MODERATOR THICKNESS AND A SEPARATE ELECTRONICS UNIT FOR PULSE AMPLIFICATION AND PULSE-HEIGHT DISCRIMINATION, WERE USED TO OBTAIN THE FOLLOWING PARTICLE TYPE AND ENERGY MEASUREMENTS: SEVEN CHANNELS MEASURING PROTONS IN THE RANGE 1 TO 500 MEV, SIX CHANNELS MEASURING ALPHA PARTICLES IN THE RANGE 4 TO 400 MEV, AND ONE CHANNEL MEASURING ELECTRONS GREATER THAN 2.8 MEV.

----- GOES 2, WILLIAMS-----

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSSDC ID- 77-048A-03 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
SOLAR PHYSICS

PERSONNEL

PI - D.J. WILLIAMS NOAA-ERL
OI - R.F. DONNELLY NOAA-ERL

BRIEF DESCRIPTION

THE X-RAY COUNTER WAS COMPOSED OF A COLLIMATOR, TWO IONIZATION CHAMBERS, AND TWO ELECTROMETERS. A SMALL ANGULAR APERTURE WAS CHOSEN FOR THE TELESCOPE COLLIMATOR, WHICH WAS MOUNTED SO THAT THE DECLINATION OF ITS AXIS COULD BE CONTROLLED BY GROUND COMMAND TO INSURE THAT THE SUN WAS VIEWED BY THE TELESCOPE ONCE DURING EVERY VEHICLE ROTATION. ONE ION CHAMBER WAS FILLED WITH ARGON AT 1 ATM FOR DETECTION OF 1- TO 8-A X RAYS AND HAS A 1.27 E-4M BERYLLIUM WINDOW TO EXCLUDE X RAYS OF LONGER WAVELENGTHS. THE OTHER CHAMBER WAS FILLED WITH XENON AT 1.5 TO 2 ATM, AND HAD A 1.27 E-3M BERYLLIUM WINDOW FOR MEASUREMENT OF X RAYS IN THE WAVELENGTH RANGE 0.5-TO 3-A.

----- GOES 2, WILLIAMS-----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- 77-048A-04 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - D.J. WILLIAMS NOAA-ERL
OI - J.N. BARFIELD NOAA-ERL
OI - H.H. SAUER NOAA-ERL

BRIEF DESCRIPTION

THE MAGNETOMETER WAS A BIAXIAL, CLOSED-LOOP, FLUXGATE MAGNETOMETER WITH THE TWO SENSORS ALIGNED AT RIGHT ANGLES TO ONE ANOTHER. AFTER MOUNTING ON A SHORT BOOM (ABOUT .61 M), ONE SENSOR WAS ALIGNED PARALLEL TO THE SPACECRAFT SPIN AXIS AND THE OTHER PERPENDICULAR TO THIS AXIS. EACH SENSOR HAD A SELECTABLE RANGE (50, 100, 200, OR 400 NT), AN OFFSET FIELD CAPABILITY (PLUS OR MINUS 1200 NT IN 40-NT STEPS), AND AN IN-FLIGHT CALIBRATION CAPABILITY.

***** GOES 3*****

SPACECRAFT COMMON NAME- GOES 3
ALTERNATE NAMES- 10952

NSSDC ID- 78-062A

LAUNCH DATE- 06/16/78 WEIGHT- 294. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 06/17/78
ORBIT PERIOD- 1450.8 MIN INCLINATION- 1.7 DEG
PERIAPSIS- 35469.1 KM ALT APOAPSIS- 36679.2 KM ALT

PERSONNEL

MG - A.J. CERVENKA NASA HEADQUARTERS
PM - R.H. PICKARD NASA-GSFC
PS - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION

GOES 3 WAS A NASA-DEVELOPED, NOAA-OPERATED SPACECRAFT. THE SPIN-STABILIZED, EARTH-SYNCHRONOUS SPACECRAFT CARRIED (1) A VISIBLE-IRRED SPIN-SCAN RADIOMETER (VISSR) TO PROVIDE HIGH-QUALITY DAY/NIGHT CLOUDCOVER DATA AND TO TAKE RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, (2) A METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM TO RELAY PROCESSED DATA FROM CENTRAL WEATHER FACILITIES TO SMALL APT-EQUIPPED REGIONAL STATIONS AND TO COLLECT AND RETRANSMIT DATA FROM REMOTELY LOCATED EARTH-BASED PLATFORMS, AND (3) A SPACE ENVIRONMENT MONITOR (SEM) SYSTEM TO MEASURE PROTON, ELECTRON, AND SRAV FLUXES AND MAGNETIC FIELDS. THE CYLINDRICALLY-SHAPED SPACECRAFT MEASURED 190.5 CM IN DIAM AND 230 CM IN LENGTH, EXCLUSIVE OF A MAGNETOMETER THAT EXTENDED AN ADDITIONAL 83 CM BEYOND THE CYLINDER SHELL. THE PRIMARY STRUCTURAL MEMBERS WERE A HONEYCOMBED EQUIPMENT SHELF AND THRUST TUBE. THE VISSR TELESCOPE WAS MOUNTED ON THE EQUIPMENT SHELF AND VIEWED THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDED RADIALLY OUT FROM THE THRUST TUBE AND WAS AFFIXED TO THE SOLAR PANELS, WHICH FORMED THE OUTER WALLS OF THE SPACECRAFT AND PROVIDED THE PRIMARY SOURCE OF ELECTRICAL POWER. LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE THRUST TUBE AND THE SOLAR PANELS WERE STATIONKEEPING AND DYNAMICS CONTROL EQUIPMENT, BATTERIES, AND MOST OF THE SEM EQUIPMENT. PROPER SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) WERE MAINTAINED BY TWO SEPARATE SETS OF JET THRUSTERS MOUNTED AROUND THE SPACECRAFT'S EQUATOR AND ACTIVATED BY GROUND COMMAND. THE SPACECRAFT USED BOTH UHF-BAND AND S-BAND FREQUENCIES IN ITS TELEMETRY AND COMMAND SUBSYSTEM. A LOW-POWER VHF TRANSPONDER PROVIDED TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVED AS A BACKUP FOR THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT ATTAINED ORBIT.

----- GOES 3, NESS STAFF-----

INVESTIGATION NAME- VISIBLE-IRRED SPIN-SCAN RADIOMETER (VISSR)

NSSDC ID- 78-062A-01 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI -	NESS STAFF	NOAA-NESS
OI - W.E. SHENK		NASA-GSFC

BRIEF DESCRIPTION

THE VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR) FLOWN ON GOES 3 WAS CAPABLE OF PROVIDING BOTH DAY AND NIGHT OBSERVATIONS OF CLOUD COVER AND EARTH/CLOUD RADIANCE TEMPERATURE MEASUREMENTS FROM A SYNCHRONOUS SPIN-STABILIZED, GEOSTATIONARY SATELLITE FOR USE IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE TWO-CHANNEL INSTRUMENT WAS ABLE TO TAKE BOTH FULL AND PARTIAL PICTURES OF THE EARTH'S DISK. BOTH THE INFRARED CHANNEL (10.5 TO 12.5 MICROMETERS) AND THE VISIBLE CHANNEL (0.55 TO 0.75 MICRON) USED A COMMON OPTICS SYSTEM. INCOMING RADIATION WAS RECEIVED BY AN ELLIPTICALLY-SHAPED SCAN MIRROR AND COLLECTED BY A RICHEY-CHRETIEN OPTICAL SYSTEM. THE SCAN MIRROR WAS SET AT A NOMINAL ANGLE OF 45 DEG TO THE VISSR OPTICAL AXIS, WHICH WAS ALIGNED PARALLEL TO THE SPIN AXIS OF THE SPACECRAFT. THE SPINNING MOTION OF THE SPACECRAFT (APPROXIMATELY 100 RPM) PROVIDED A WEST-TO-EAST SCAN MOTION WHEN THE SPIN AXIS OF THE SPACECRAFT WAS ORIENTED PARALLEL WITH THE EARTH'S AXIS. THE LATITUDINAL SCAN WAS ACCOMPLISHED BY SEQUENTIALLY TILTING THE SCANNING MIRROR NORTH TO SOUTH AT THE COMPLETION OF EACH SPIN. A FULL PICTURE TOOK 18.2 MIN TO COMPLETE AND ABOUT 2 MIN TO RETRACE. DURING EACH SCAN, EIGHT VISIBLE-SPECTRUM DETECTORS SWEEPED THE EARTH, WITH A GROUND RESOLUTION OF 0.9 KM AT ZERO NADIR ANGLE. A MERCURY-CADMIUM TELLURIDE DETECTOR SENSED THE INFRARED PORTION OF THE SPECTRUM WITH A HORIZONTAL RESOLUTION OF APPROXIMATELY 9 KM AT ZERO NADIR ANGLE. THE INFRARED PORTION OF THE DETECTOR MEASURED RADIANCE TEMPERATURES BETWEEN 180 AND 315 DEG K WITH A PROPOSED SENSITIVITY BETWEEN 0.4 AND 1.4 K. THE VISSR OUTPUT WAS DIGITIZED AND TRANSMITTED TO THE NOAA COMMAND DATA ACQUISITION STATION, WALLOPS ISLAND, VA. THERE THE SIGNAL WAS FED INTO A 'LINE STRETCHER,' WHERE IT WAS STORED AND TIME-STRETCHED FOR TRANSMISSION BACK TO THE SATELLITE AT REDUCED BANDWIDTH FOR REBROADCAST TO APT USER STATIONS. AS WITH ALL OPERATIONAL TYPE DATA, THE VISSR DATA WERE HANDLED BY NOAA AND EVENTUALLY SENT TO THE NATIONAL CLIMATIC CENTER AT ASHEVILLE, NORTH CAROLINA, FOR ARCHIVING.

----- GOES 3, NESS STAFF-----

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM

NSSDC ID- 78-062A-05 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI -	NESS STAFF	NOAA-NESS
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BRIEF DESCRIPTION

THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM WAS AN EXPERIMENTAL COMMUNICATIONS AND DATA HANDLING SYSTEM DESIGNED TO RECEIVE AND PROCESS METEOROLOGICAL DATA COLLECTED FROM REMOTELY LOCATED EARTH-BASED DATA COLLECTION (OBSERVATION) PLATFORMS (DCP). THE COLLECTED DATA WERE RETRANSMITTED FROM THE SATELLITE TO SMALL, GROUND-BASED, REGIONAL DATA UTILIZATION CENTERS. DATA FROM UP TO 10,000 DCP STATIONS COULD BE HANDLED BY THE SYSTEM. THE SYSTEM ALSO ALLOWED FOR THE RETRANSMISSION OF NARROW-BAND (WEXAF TYPE) DATA FROM CENTRALIZED WEATHER FACILITIES TO EXISTING SMALL, GROUND-BASED APT RECEIVING STATIONS. THIS COMMUNICATIONS SYSTEM OPERATED ON S-BAND FREQUENCIES. THE MINIMUM DATA COLLECTION SYSTEM FOR ONE SMALL METEOROLOGICAL SATELLITE CONSISTED OF APPROXIMATELY 3500 DCP STATIONS TO BE CONTACTED IN A 6-H PERIOD. THE TOTAL AMOUNT OF DATA COLLECTED DURING THE 6-H PERIOD WAS BETWEEN 350K AND 600K BITS, DEPENDING ON THE CODING TECHNIQUES. DATA RECEIVED FROM INDIVIDUAL STATIONS VARIED FROM 50 TO 3000 BITS, DEPENDING ON THE TYPE AND VARIETY OF SENSORS USED AT AN INDIVIDUAL DCP STATION.

----- GOES 3, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR

NSSDC ID- 78-062A-02 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS	NOAA-ERL
OI - H.H. SAUER	NOAA-ERL

BRIEF DESCRIPTION

A NUMBER OF SEPARATE SILICON SOLID-STATE DETECTORS, EACH WITH A TAILORED MODERATOR THICKNESS AND A SEPARATE ELECTRONICS UNIT FOR PULSE AMPLIFICATION AND PULSE-HEIGHT DISCRIMINATION, WERE USED TO OBTAIN THE FOLLOWING PARTICLE TYPE AND ENERGY MEASUREMENTS -- SEVEN CHANNELS MEASURING PROTONS IN THE RANGE 1 TO 500 MEV, SIX CHANNELS MEASURING ALPHA PARTICLES IN THE RANGE 4 TO 400 MEV, AND ONE CHANNEL MEASURING ELECTRONS GREATER THAN 2.8 MEV.

----- GOES 3, WILLIAMS-----

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSSDC ID- 78-062A-03 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - D.J. WILLIAMS	NOAA-ERL
OI - R.F. DONNELLY	NOAA-ERL

BRIEF DESCRIPTION

THE X-RAY COUNTER WAS COMPOSED OF A COLLIMATOR, TWO IONIZATION CHAMBERS, AND TWO ELECTROMETERS. A SMALL ANGULAR APERTURE WAS CHOSEN FOR THE TELESCOPE COLLIMATOR, WHICH WAS MOUNTED SO THAT THE DECLINATION OF ITS AXIS COULD BE CONTROLLED BY GROUND COMMAND TO INSURE THAT THE SUN WAS VIEWED BY THE TELESCOPE ONCE DURING EVERY VEHICLE ROTATION. ONE ION CHAMBER WAS FILLED WITH ARGON AT 1 ATM FOR DETECTION OF 1- TO 8-A X RAYS AND HAD A 1.27-E-4M BERYLLIUM WINDOW TO EXCLUDE X RAYS OF LONGER WAVELENGTHS. THE OTHER CHAMBER WAS FILLED WITH XENON AT 1.5 TO 2 ATM, AND HAD A 1.27-E-3M BERYLLIUM WINDOW FOR MEASUREMENTS OF X RAYS IN THE WAVELENGTH RANGE 0.5 TO 3 A.

----- GOES 3, WILLIAMS-----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- 78-062A-04 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS	NOAA-ERL
OI - J.N. BARFIELD	NOAA-ERL

BRIEF DESCRIPTION

THE MAGNETOMETER WAS A BIAxIAL, CLOSED-LOOP, FLUXGATE MAGNETOMETER WITH THE TWO SENSORS ALIGNED AT RIGHT ANGLES TO ONE ANOTHER. AFTER MOUNTING ON A SHORT BOOM (ABOUT .61 M), ONE SENSOR WAS ALIGNED PARALLEL TO THE SPACECRAFT SPIN AXIS AND THE OTHER PERPENDICULAR TO THIS AXIS. EACH SENSOR HAD A SELECTABLE RANGE (50, 100, 200, OR 400 NT), AN OFFSET FIELD CAPABILITY (PLUS OR MINUS 1200 NT IN 40-NT STEPS), AND AN IN-FLIGHT CALIBRATION CAPABILITY.

***** HAKUCHO*****

SPACECRAFT COMMON NAME- HAKUCHO
ALTERNATE NAMES- COSMIC RADIATION SAT B, CORSA-B
11272

NSSDC ID- 79-014A

LAUNCH DATE- 02/21/79
LAUNCH SITE- KAGOSHIMA, JAPAN
LAUNCH VEHICLE- M-3C

WEIGHT- 100. KG

SPONSORING COUNTRY/AGENCY
JAPAN ISAS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 02/22/79
ORBIT PERIOD- 96. MIN INCLINATION- 29.9 DEG
PERIAPSIS- 545. KM ALT APOAPSIS- 577. KM ALT

PERSONNEL
PM - M. ODA U OF TOKYO
PS - S. HAYAKAWA NAGOYA U

BRIEF DESCRIPTION

THE COSMIC RADIATION SATELLITE, HAKUCHO, HAD THE SHAPE OF AN OCTAGONAL RIGHT PRISM WITH A MAXIMUM WIDTH OF 80 CM AND A HEIGHT OF 65 CM. THE SPACECRAFT WAS SPIN-STABILIZED WITH A SPIN RATE OF 5 RPM. THE SPIN AXIS WAS MANEUVERED BY MEANS OF MAGNETIC TORQUING TOWARDS THE CELESTIAL OBJECTS TO BE OBSERVED. X-RAY DETECTORS LOOKED PARALLEL AND PERPENDICULAR TO THE SPIN AXIS, OBSERVING X-RAY SOURCES OVER A WIDE ENERGY RANGE WITH SHORT TIME RESOLUTION.

----- HAKUCHO, MAKINO-----

INVESTIGATION NAME- DIFFUSE SOFT X-RAYS AND SOFT X-RAY SOURCES

NSSDC ID- 79-014A-02 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE
INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - F. MAKINO NAGOYA U
PI - Y. TANAKA U OF TOKYO

BRIEF DESCRIPTION

THIS EXPERIMENT SURVEYED THE SKY AND MONITORED TRANSIENT SOFT X-RAY SOURCES IN THE ENERGY RANGE 0.1 TO 2 KEV BY MEANS OF GAS-FLOW-TYPE PROPORTIONAL COUNTERS WITH THIN POLYPROPYLENE WINDOWS.

----- HAKUCHO, MIYAMOTO-----

INVESTIGATION NAME- MONITOR OF X-RAY SOURCES

NSSDC ID- 79-014A-01 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE
INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - S. MIYAMOTO OSAKA CITY U
PI - Y. OGAWARA U OF TOKYO
PI - I. KONO U OF TOKYO
PI - M. YOSHIMORI ST PAUL U

BRIEF DESCRIPTION

THIS EXPERIMENT LOCATED AND MONITORED X-RAY BURST SOURCES OVER THE ENERGY RANGE 1 TO 100 KEV USING ROTATING MODULATION COLLIMATORS.

***** HCMM*****

SPACECRAFT COMMON NAME- HCMM
ALTERNATE NAMES- SATS, APPL EXPL MISSION A
HEAT CAPACITY MAP MSN, AEM-A
10818

NSSDC ID- 78-041A

LAUNCH DATE- 04/26/78
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- SCOUT-F

WEIGHT- 117. KG

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 04/27/78
ORBIT PERIOD- 96.7 MIN INCLINATION- 97.6 DEG
PERIAPSIS- 558. KM ALT APOAPSIS- 646. KM ALT

PERSONNEL

MG - D.S. DILLER	NASA HEADQUARTERS
SC - B.B. SCHARDT	NASA HEADQUARTERS
PM - C.M. MACKENZIE	NASA-GSFC
PS - J.C. PRICE	NASA-GSFC

BRIEF DESCRIPTION

THE OBJECTIVE OF THE HEAT CAPACITY MAPPING MISSION (HCMM) WAS TO PROVIDE COMPREHENSIVE, ACCURATE, HIGH SPATIAL RESOLUTION THERMAL SURVEYS OF THE SURFACE OF THE EARTH. THE SPACECRAFT WAS SPIN STABILIZED AT A RATE OF 14 RPM. THE HCMM CIRCULAR SUN-SYNCHRONOUS ORBIT ALLOWED THE SPACECRAFT TO SENSE SURFACE TEMPERATURE NEAR THE MAXIMUM AND MINIMUM OF THE DIURNAL CYCLE. THE ORBIT HAD AN ASCENDING DAYLIGHT MODE WITH NOMINAL EQUATORIAL CROSSING TIME OF 2:00 PM, AND PROVIDED A 1:30 PM TO 2:30 AM CROSSING TIME OVER MIDDLE NORTHERN LATITUDES. THE ORBIT ALSO ALLOWED FOR REFLECTANCE MEASUREMENTS DURING DAYLIGHT PASSES.

----- HCMM, BARNES-----

INVESTIGATION NAME- HEAT CAPACITY MAPPING RADIOMETER

NSSDC ID- 78-041A-01 INVESTIGATIVE PROGRAM
CODE ER

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

PERSONNEL
PI - W.L. BARNES NASA-GSFC

BRIEF DESCRIPTION

THE OBJECTIVES OF THE HEAT CAPACITY MAPPING RADIOMETER (HCMM) WERE AS FOLLOWS -- (1) TO PRODUCE THERMAL MAPS AT THE OPTIMUM TIMES FOR MAKING THERMAL INERTIA STUDIES FOR DISCRIMINATION OF ROCK TYPES AND MINERAL RESOURCES LOCATION, (2) TO MEASURE PLANT CANOPY TEMPERATURES AT FREQUENT INTERVALS TO DETERMINE THE TRANSPIRATION OF WATER AND PLANT LIFE, (3) TO MEASURE SOIL MOISTURE EFFECTS BY OBSERVING THE TEMPERATURE CYCLE OF SOILS, (4) TO MAP THERMAL EFFLUENTS, BOTH NATURAL AND MAN-MADE, (5) TO INVESTIGATE THE FEASIBILITY OF GEOTHERMAL SOURCE LOCATION BY REMOTE SENSING, AND (6) TO PROVIDE FREQUENT COVERAGE OF SNOW FIELDS FOR WATER RUNOFF PREDICTION. THE HCMM TRANSMITTED ANALOG DATA IN REAL TIME TO SELECTED RECEIVING STATIONS. IT WAS DESIGNED TO PROVIDE ACCURATE, HIGH SPATIAL RESOLUTION THERMAL MAPS OF THE SURFACE OF THE EARTH AT AN OPTIMUM TIME FOR DETERMINATION OF THERMAL INERTIA. THE HIGH THERMAL RESOLUTION DATA WAS ALSO USED TO MAP THERMAL GRADIENTS IN BODIES OF WATER. THE RADIOMETER WAS SIMILAR TO THE HIGH-RESOLUTION SURFACE COMPOSITION MAPPING RADIOMETER (HRSCMR) OF NIMBUS 5 (72-097A). THE HCMM HAD A SMALL INSTANTANEOUS GEOMETRIC FIELD OF VIEW (LESS THAN 1 BY 1 MILLIRADIANS), HIGH RADIOMETRIC ACCURACY, AND A WIDE ENOUGH SWATH COVERAGE ON THE GROUND SO THAT SELECTED AREAS WERE COVERED WITHIN THE 12-H PERIOD CORRESPONDING TO THE MAXIMUM AND MINIMUM OF TEMPERATURE OBSERVED. THE INSTRUMENT OPERATED IN TWO CHANNELS, 10.5 TO 12.5 MICROMETERS (IR) AND 0.8 TO 1.1 MICROMETERS (VISIBLE). THE LATTER CHANNEL WAS MATCHED TO THE ERTS-1 (72-058A) BAND 4. THE INSTRUMENT UTILIZED A RADIATION COOLER TO COOL THE TWO HE-CD-TE DETECTORS TO 100 K. THE EXPERIMENT INCLUDED AN ANALOG MULTIPLEXER THAT ACCEPTED THE ANALOG OUTPUT OF EACH DETECTOR AND MULTIPLEXED THEM IN A FORM SUITABLE FOR TRANSMISSION BY THE SPACECRAFT S-BAND TRANSMITTER. THE DATA WERE AVAILABLE THROUGH THE EROS DATA CENTER, SIOUX FALLS, SD. MORE COMPLETE INFORMATION CAN BE FOUND IN SMITH, S.R. 'APPLICATIONS EXPLORER MISSIONS (AEM) MISSION PLANNER'S HANDBOOK.'

***** HEAO 1*****

SPACECRAFT COMMON NAME- HEAO 1
ALTERNATE NAMES- HIGH ENERGY ASTRON OBS-A, HEAO-A
10217

NSSDC ID- 77-075A

LAUNCH DATE- 08/12/77
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

WEIGHT- 2552. KG

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 08/13/77
ORBIT PERIOD- 93.5 MIN INCLINATION- 22.8 DEG
PERIAPSIS- 441. KM ALT APOAPSIS- 452. KM ALT

PERSONNEL
MG - R.E. HALPERN NASA HEADQUARTERS
SC - A.G. OPP NASA HEADQUARTERS
PM - F.A. SPEER NASA-MSFC
PS - F.B. McDONALD NASA-GSFC

BRIEF DESCRIPTION

HIGH-ENERGY ASTRONOMY OBSERVATORY 1 WAS THE FIRST IN A SERIES OF THREE SATELLITE OBSERVATORIES DESIGNED TO CONTINUE THE X-RAY AND GAMMA-RAY STUDIES INITIATED BY ANS, OAO 3, UK 5, THE OSO SERIES, THE SAS SERIES, AND THE GAMMA-RAY BURST DISCOVERIES OF THE VELA SATELLITES. THESE MISSIONS WERE DESIGNED TO SURVEY AND MAP THE CELESTIAL SPHERE FOR X-RAY SOURCES AT AN INTENSITY LEVEL OF 1.E-6 OF THE BRIGHTEST KNOWN SOURCE (SCO X-1), AND TO INVESTIGATE THE STRUCTURE AND SHAPE OF

GALACTIC AND EXTRAGALACTIC COSMIC-RAY NUCLEI THROUGH THEIR INFLUENCE ON THE EARTH'S ATMOSPHERE. EACH SPACECRAFT OF THE SERIES HAD A COMMON SPACECRAFT EQUIPMENT MODULE (SEM) AND A UNIQUE EXPERIMENT MODULE (EM). THIS MISSION WAS SPECIFICALLY DESIGNED TO MAP X-RAY AND GAMMA-RAY SOURCES FROM 150 EV TO 10 MEV, TO ESTABLISH THE SIZE AND PRECISE LOCATION OF X-RAY SOURCES WITH AN ENERGY RANGE OF 1 KEV TO 15 KEV, TO DETERMINE THE CONTRIBUTION OF DISCRETE SOURCES TO THE X-RAY BACKGROUND, AND TO MEASURE TIME VARIATIONS OF X-RAY SOURCES. CONTINUOUS CELESTIAL SCANS WERE MADE PERPENDICULAR TO THE Z AXIS (POINTING TO THE SUN) DURING THE INITIAL PHASE OF THE MISSION. SCAN RATE WAS 0.03 REVOLUTIONS/MIN. THE ENTIRE CELESTIAL SPHERE WOULD BE SCANNED IN 6 MONTHS. SPECIAL MANEUVERS OF UP TO 5 TIMES/WEEK, TO OFFSET FROM THE SUN UP TO 7 DEG FOR SHORT OBSERVATION PERIODS, WERE PART OF THE MISSION'S OBJECTIVES. WHEN PASSING OVER THE SOUTH ATLANTIC ANOMALY (SAA), HIGH-VOLTAGE SUPPLIES WERE TURNED OFF OR REDUCED TO PREVENT DAMAGE DUE TO SATURATION EFFECTS. THE SIX-SIDED HEAO 1 WAS 5.68 M HIGH, 2.67 M IN DIAMETER, AND WEIGHED 2552 KG INCLUDING 1220 KG OF EXPERIMENTS. DOWNLINK TELEMETRY WAS AT A DATA RATE OF 6.5 KB/S FOR REAL-TIME DATA AND 128 KB/S FOR EITHER OF THE TWO TAPE RECORDER SYSTEMS.

----- HEAO 1, BOLDT-----

INVESTIGATION NAME- COSMIC X-RAY EXPERIMENT

NSSDC ID- 77-075A-02

INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

PI - E.A. BOLDT NASA-GSFC
PI - G.P. GARMIRE CALIF INST OF TECH

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO MEASURE THE DIFFUSE X-RAY BACKGROUND IN THE ENERGY RANGE OF 0.15 TO 60 KEV. OBJECTIVES WERE TO MEASURE RELATIVE DIFFUSION AND ABSORPTION OF DIFFUSE HARD AND SOFT X-RAYS AT HIGH GALACTIC LATITUDES, AND THEN CORRELATE THESE MEASUREMENTS WITH RADIO AND OPTICAL STUDIES; DETERMINE DISCRETE SOURCE BACKGROUND CONTRIBUTION; DETECT LARGE-SCALE GLOBAL ANISOTROPIES ASSOCIATED WITH SOLAR SYSTEM MOTION WITH RESPECT TO DISTANT EMISSION SOURCES; MAKE BROADBAND SPECTRAL CLASSIFICATIONS OF DIFFUSE AND DISCRETE X-RAY SOURCES; AND ESTABLISH TEMPORAL VARIATIONS OF MULTI-COMPONENT SPECTRAL SOURCES. THREE TYPES OF MULTIANODE, MULTILAYER COUNTERS WERE USED FOR THIS EXPERIMENT. THREE HIGH ENERGY DETECTORS (HED) WITH XENON FILLED COUNTERS COVERED THE ENERGY RANGE OF 3 TO 60 KEV WITH AN EFFECTIVE AREA OF 900 SQ CM. THE MINIMUM DETECTABLE FLUX IN A 1.0E3 S OBSERVATION WAS 1.0E-4/SQ CM-S-KEV FOR ENERGY BANDS 3 TO 20 KEV AND 20 TO 60 KEV. ONE MEDIUM ENERGY DETECTOR (MED) WITH AN ARGON/METHANE FILLED COUNTER COVERED THE ENERGY RANGE 1.5-15 KEV. THE EFFECTIVE AREA OF THIS COUNTER WAS 900 SQ CM. THE MINIMUM DETECTABLE FLUX IS THE SAME AS FOR THE HED'S. THE TWO LOW-ENERGY DETECTORS (LED) WERE THIN-WINDOW, PROPANE GAS, FLOW COUNTERS TO COVER THE ENERGY RANGE OF 0.15 TO 3 KEV. THE LED USED PERMANENT MAGNETS TO PREVENT INCIDENT ELECTRONS FROM REACHING THE DETECTOR WINDOW AND A SUNSHADE WHENEVER DIRECT SUNLIGHT WAS NEAR THE FIELD OF VIEW. IT HAD A 600 SQ CM EFFECTIVE AREA. THE MINIMUM DETECTABLE FLUX FOR A 1.0E3 S OBSERVATION WAS 1.0E-3/SQ CM-S-KEV FOR THE 0.15 TO 0.28 KEV BAND AND FOR THE 0.5 TO 3.0 KEV BAND.

----- HEAO 1, FRIEDMAN-----

INVESTIGATION NAME- LARGE AREA COSMIC X-RAY SURVEY

NSSDC ID- 77-075A-01

INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

PI - H. FRIEDMAN US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

THIS INSTRUMENT WAS A MODULAR ASSEMBLY OF SEVEN LARGE-AREA, THIN-WINDOW, PROPORTIONAL COUNTER SENSOR MODULES TO RECORD INCIDENT X-RAY FLUXES. THE OBJECTIVES WERE TO MAP THE CELESTIAL SPHERE IN THE ENERGY RANGE FROM .15 TO 20 KEV WITH GREATER SENSITIVITY THAN ACHIEVED HERETOFORE AND TO MEASURE THE SPECTRA, LOCATION, AND TIME VARIATIONS OF X-RAY SOURCES WITH A 0.1 TO 1 DEG ANGULAR RESOLUTION. EACH OF THE SENSOR MODULES CONSISTED OF A PROPORTIONAL COUNTER BODY FRAME ON WHICH WAS MOUNTED A WINDOW SUPPORT STRUCTURE, COUNTER BACK STRUCTURE WITH INTEGRAL CONTROL COUNTER, COLLIMATOR ASSEMBLY, AND ELECTRONIC SUBASSEMBLIES. A HONEYCOMB CELL CONSTRUCTION FOR THE BASIC COUNTER PROVIDED X-RAY COLLIMATION OF 80 DEG BY 4 DEG FWHM. A BACK LAYER OF THE THREE-LAYERED COUNTER PROVIDED ANTICOINCIDENT PROTECTION AGAINST CHARGED PARTICLE EVENTS. THE FRONT LAYER WAS THE MAIN X-RAY SENSOR FOR MOST ENERGY RANGES. ALL THREE LAYERS PROVIDED DATA AT HIGHER ENERGIES. THE COLLIMATOR FOR EACH OF THE COUNTERS VIEWED THE SKY. THE COLLIMATOR ON SENSOR MODULES 1 THROUGH 4 PROVIDED 1 DEG BY 4 DEG COLLIMATION, ON SENSOR MODULES 5 AND 6 PROVIDED 1 DEG BY 0.5 DEG COLLIMATION, AND ON SENSOR MODULE 7 PROVIDED 8 DEG BY 2 DEG COLLIMATION. EACH OF THE SENSORS INCLUDED MOVABLE RADIOACTIVE CALIBRATION SOURCES TO PROVIDE A CHECK ON COUNTER OPERATION AND CHANNEL POSITION. THERE WAS ALSO A MAGNET ASSEMBLY TO DEFLECT LOW-ENERGY RADIATION BELT ELECTRONS. THE CONTROL COUNTER WAS A

SMALL COUNTER AT THE BACK OF THE ASSEMBLY THAT SHARED THE COUNTING GAS WITH THE MAIN COUNTER. IT WAS EXCITED BY AN FE-55 SOURCE AND SERVED TO GENERATE THE PROPER OPERATING VOLTAGE ON THE MAIN COUNTER TO COMPENSATE FOR GAS DENSITY CHANGES AND HIGH VOLTAGE DRIFTS.

----- HEAO 1, PETERSON-----

INVESTIGATION NAME- LOW-ENERGY GAMMA-RAY AND HARD X-RAY SKY SURVEY

NSSDC ID- 77-075A-04

INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL

PI - L.E. PETERSON U OF CALIF, SAN DIEGO
PI - W.H.G. LEWIN MASS INST OF TECH

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURED POINT AND DIFFUSE SOURCES OF X-RAYS AND GAMMA RAYS IN THE 10-KEV TO 10-MEV RANGE. THE INSTRUMENT CONSISTED OF SEVEN NAI(TL)/CSI(NA) PHOSWICH SCINTILLATORS SURROUNDED BY EIGHT LARGE CSI(NA) SCINTILLATORS THAT PROVIDED SHIELDING AND DEFINED THE FIELDS OF VIEW. THERE WERE THREE DETECTOR TYPES. THE INTERMEDIATE-ENERGY DETECTORS HAD AN ENERGY RANGE OF 10-200 KEV, AN AREA OF 225 SQ CM, CSI SHIELDING OF 2 IN., AND A FIELD OF VIEW (FWHM) OF 1 DEG X 20 DEG. THE SLAT COLLIMATORS OF THE INTERMEDIATE-ENERGY DETECTORS WERE POSITIONED AT 60 DEG RELATIVE TO THE SCAN DIRECTION, ALLOWING POINT SOURCE DETERMINATION TO 1 DEG OVER THE APPROXIMATELY 40-DEG-WIDE BAND SCANNED EACH SPACECRAFT ROTATION. THE POINT-MODE DETECTORS HAD AN ENERGY RANGE OF 0.1-5 MEV, AN AREA OF 180 SQ CM, CSI SHIELDING OF ABOUT 4 IN., AND A FIELD OF VIEW (FWHM) OF 20 DEG. SOURCES DETECTED WERE IDENTIFIED WITH LOW-ENERGY SOURCES BY SPECTRAL SIMILARITY WITH MEASUREMENTS MADE BY THE INTERMEDIATE-ENERGY DETECTOR AT ABOUT 100 KEV. THE DIFFUSE-MODE DETECTORS HAD AN ENERGY RANGE OF 0.2-10 MEV, AN AREA OF 125 SQ CM, CSI SHIELDING OF ABOUT 6 IN., AND A FIELD OF VIEW (FWHM) OF 10 DEG. POINT SOURCES MEASURED BY THE DIFFUSE-MODE DETECTORS WERE RELATED TO THOSE WITH SIMILAR SPECTRA IN THE POINT-MODE DETECTORS. EACH OF THE DETECTORS WAS EQUIPPED WITH A PULSE-SHAPE ANALYZER AND DISCRIMINATOR WHICH DETECTED AND VETOED CSI(NA) EVENTS. THE COMBINATION OF SHIELD UPPER- AND LOWER-LEVEL DISCRIMINATORS (NOMINAL SETTINGS OF 5 MEV AND 0.1 MEV) USED FOR DETECTOR ANTICOINCIDENCE WERE SELECTABLE BY COMMAND. EVENT TIME WAS NOMINALLY KNOWN TO 0.1 S ACCURACY. THIS COULD BE IMPROVED TO 5 MS OR 2.0E-5 S BY COMMAND. EVENTS SATISFYING THE ANTICOINCIDENCE CONDITION WERE PULSE-HEIGHT ANALYZED AND TELEMETERED ON AN EVENT-BY-EVENT BASIS BY A MAIN PULSE-HEIGHT ANALYZER (MPHA) SYSTEM. A ROVING PULSE-HEIGHT ANALYZER (RPHA) PERFORMED ENERGY AND PULSE-SHAPE ANALYZER CALIBRATIONS AND MONITORED SHIELD PERFORMANCE. IT WAS ALSO USED IN THE STUDY OF STRONG X-RAY SOURCES THAT WERE GREATER THAN THE MPHA SYSTEM'S READOUT RATE. THIS INSTRUMENT ALSO CONTAINED THREE PARTICLE MONITORS, WHICH MEASURED PROTON AND ELECTRON FLUXES IN THREE ENERGY RANGES. THERE WAS A HIGH-RESOLUTION TIMING SYSTEM THAT MEASURED COSMIC GAMMA-RAY BURSTS, BY SUMMING THE SIGNALS OF THE EIGHT LARGE CSI(NA) SHIELDS THAT HAVE A TOTAL OMNIDIRECTIONAL COLLECTION AREA OF ABOUT 2400 SQ CM, AND DISCRIMINATING THE SUMMED SIGNAL IN A SYSTEM WITH THRESHOLDS OF 0.1, 0.2, 0.4, 0.8, AND 1.6 MEV.

----- HEAO 1, SCHWARTZ-----

INVESTIGATION NAME- X-RAY SCANNING MODULATION COLLIMATOR

NSSDC ID- 77-075A-03

INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

PI - D. SCHWARTZ SAO
PI - H.V.D. BRADT MASS INST OF TECH

BRIEF DESCRIPTION

THIS EXPERIMENT USED A SCANNING MODULATION COLLIMATOR (SMC) INSTRUMENT TO DETERMINE, FOR SELECTED X-RAY SOURCES, THEIR POSITION WITHIN 5 ARC S; THEIR ANGULAR SIZE TO A PRECISION OF 5-10 ARC S IN THREE ENERGY INTERVALS FROM 1-15 KEV; AND TO STUDY THE STRUCTURE OF THEIR X-RAY EMISSION TO A PRECISION OF 10 ARC S IN THREE ENERGY INTERVALS FROM 1-15 KEV. THE SMC WAS COMPRISED OF TWO PARTS, EACH CONTAINING FOUR WIRE GRID PLANES. EACH PROVIDED A LOCATION AND ANGULAR SIZE MEASUREMENT IN ONE DIMENSION. AN ADDITIONAL COLLIMATOR LOCATED FORWARD TO THE FRONT GRID RESTRICTED THE OVERALL INSTANTANEOUS FIELD OF VIEW TO 4 DEG X 4 DEG FWHM FOR EACH SMC. THE OUTWARD VIEW DIRECTION IS PERPENDICULAR TO THE SPACECRAFT SPIN AXIS (Z-AXIS) AND HENCE THE INSTRUMENT SCANS A GREAT CIRCLE BAND ON THE SKY. THE TWO PARTS OF THE SMC DIFFER BY HAVING THEIR PLANE OF MAXIMUM TRANSMISSION INCLINED +10 DEG AND -10 DEG TO THE SCAN DIRECTION. PRECISE TWO-DIMENSIONAL LOCATIONS ARE DETERMINED BY THE INTERSECTIONS OF THE LOCATIONS OBTAINED FROM EACH OF THE COLLIMATORS. THE ANGULAR RESPONSE OF THE TWO SMC COMPONENTS WAS 30 AND 120 ARC S, WHICH EXTENDED THE DYNAMIC RANGE UP TO 16 ARC MIN OVER WHICH ANGULAR SIZE AND STRUCTURE MEASUREMENTS WERE MADE. THE SMC INSTRUMENT WAS CAPABLE OF DETECTING X-RAY SOURCES WITH AN INTENSITY OF 1.0E-3 THAT OF THE

CRAB NEBULA. THIS EXPERIMENT WAS ALSO EQUIPPED WITH TWO ASPECT SENSORS TO PROVIDE DATA ON THE STELLAR ORIENTATION OF THE COLLIMATOR AXES TO ACHIEVE THE 5 ARC-S POSITION OF SOURCES.

***** HEAD 2*****

SPACECRAFT COMMON NAME- HEAD 2
ALTERNATE NAMES- HIGH ENERGY ASTRON OBS-B, 11101
HEAD-B, EINSTEIN

NSSDC ID- 78-103A

LAUNCH DATE- 11/13/78 WEIGHT- 2660. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 11/14/78
ORBIT PERIOD- 94.0 MIN INCLINATION- 23.5 DEG
PERIAPSIS- 465. KM ALT APOAPSIS- 476. KM ALT

PERSONNEL
MG - R.E. HALPERN NASA HEADQUARTERS
SC - A.G. OPP NASA HEADQUARTERS
PM - F.A. SPEER NASA-GSFC
PS - S.S. HOLT NASA-GSFC

BRIEF DESCRIPTION
THIS SECOND MISSION WAS A POINTING MISSION PROVIDING MORE DETAILED INFORMATION ABOUT PREVIOUSLY IDENTIFIED X-RAY SOURCES. A LARGE GRAZING-INCIDENCE X-RAY TELESCOPE PROVIDED IMAGES OF SOURCES THAT WERE THEN ANALYZED BY INTERCHANGEABLE INSTRUMENTS AT THE FOCAL PLANE OF THE TELESCOPE. THE TELESCOPE COLLECTED X-RAYS OVER AN ANGULAR RANGE OF APPROXIMATELY 1 DEG X 1 DEG, WITH THE FOCAL PLANE INSTRUMENTS DETERMINING THE LIMITING RESOLUTION FOR EACH MEASUREMENT. THESE INSTRUMENTS INCLUDED A SOLID-STATE X-RAY DETECTOR, A CURVED-CRYSTAL BRAGG SPECTROMETER, AN IMAGING PROPORTIONAL COUNTER, AND A CHANNEL-PLATE IMAGING ARRAY. IN ADDITION, A MONITOR PROPORTIONAL COUNTER VIEWED THE SKY ALONG THE TELESCOPE AXIS. THE SCIENTIFIC OBJECTIVES WERE TO -- (1) ACCURATELY LOCATE AND EXAMINE X-RAY SOURCES IN THE ENERGY RANGE 0.2 TO 4.0 KEV WITH HIGH RESOLUTION; (2) PERFORM HIGH-SPECTRAL-SENSITIVITY MEASUREMENTS WITH BOTH HIGH- AND LOW-DISPERSION SPECTROGRAPHS; (3) PERFORM HIGH-SENSITIVITY MEASUREMENTS OF TRANSIENT X-RAY BEHAVIOR. THE SAME TYPE OF SPACECRAFT USED FOR HEAD 1 WAS EMPLOYED; I.E., A SIX-SIDED STRUCTURE 5.68 M HIGH AND 2.67 M IN DIAMETER. DOWNLINK TELEMETRY WAS AT A DATA RATE OF 6.5 KB/S FOR REAL-TIME DATA AND 128 KB/S FOR EITHER OF TWO TAPE-RECORDER SYSTEMS. AN ATTITUDE-CONTROL-AND-DETERMINATION SUBSYSTEM WAS USED TO POINT AND MANEUVER THE SPACECRAFT. GYROS, SUN SENSORS, AND STAR TRACKERS WERE EMPLOYED AS SENSING DEVICES.

----- HEAD 2, GIACCONI-----

INVESTIGATION NAME- MONITOR PROPORTIONAL COUNTER

NSSDC ID- 78-103A-01 INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - R. GIACCONI SAO
OI - H. TANANBAUM SAO
OI - G.W. CLARK MASS INST OF TECH
OI - S.S. HOLT NASA-GSFC
OI - R. NOVICK COLUMBIA U

BRIEF DESCRIPTION
THIS EXPERIMENT UTILIZED A MONITOR COUNTER AS A SUPPORT INSTRUMENT FOR CALIBRATION AND NORMALIZATION OF THE FOCAL-PLANE INSTRUMENTATION. IT WAS USED TO (1) NORMALIZE INTENSITY FLUCTUATIONS DURING SPECTROMETER OBSERVATIONS, (2) OBSERVE THE CONTINUUM DURING SPECTRAL LINE OBSERVATIONS, AND (3) CALIBRATE CERTAIN INSTRUMENTS IN FLIGHT.

----- HEAD 2, GIACCONI-----

INVESTIGATION NAME- HIGH-RESOLUTION IMAGER

NSSDC ID- 78-103A-02 INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - R. GIACCONI SAO
OI - H. TANANBAUM SAO
OI - G.W. CLARK MASS INST OF TECH
OI - S.S. HOLT NASA-GSFC
OI - R. NOVICK COLUMBIA U

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION WERE TO (1) DETECT AND ACCURATELY LOCATE X-RAY SOURCES FROM 0.2 TO 4.0 KEV, (2) STUDY THE STRUCTURE OF OBJECTS LARGER THAN 2 ARC S, AND (3) MEASURE THE INTENSITY AND TEMPORAL CHARACTERISTICS OF INDIVIDUAL SOURCES. THIS INSTRUMENT WAS A CHANNEL-PLATE IMAGING ARRAY OF DETECTORS WITH A PIXEL SIZE CORRESPONDING TO APPROXIMATELY 2 ARC S.

----- HEAD 2, GIACCONI-----

INVESTIGATION NAME- CURVED-CRYSTAL BRAGG X-RAY

NSSDC ID- 78-103A-03 INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - R. GIACCONI SAO
OI - H. TANANBAUM SAO
OI - G.W. CLARK MASS INST OF TECH
OI - S.S. HOLT NASA-GSFC
OI - R. NOVICK COLUMBIA U

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS EXPERIMENT WAS TO SEARCH FOR X-RAY SPECTRAL-LINE EMISSIONS ARISING FROM THE SELECTED CELESTIAL OBJECTS. THE SEARCH WAS LIMITED TO THE ENERGY LEVEL FROM 0.18 TO 3 KEV. THE INSTRUMENT WAS A CURVED-CRYSTAL BRAGG SPECTROMETER USING THE FOLLOWING SIX CRYSTALS: LEAD STEARATE AND LEAD LAURATE, WHICH GAVE RESOLUTIONS IN LAMBDA/DELTA LAMBDA OF 50-100; TAP, 70-200; PET, 100-500; RAP, 150-1000; AND ADP, 200-1000. THE X-RAY LINES WERE DETECTED BY A THIN-WINDOW, POSITION-SENSITIVE PROPORTIONAL COUNTER.

----- HEAD 2, GIACCONI-----

INVESTIGATION NAME- IMAGING PROPORTIONAL COUNTER

NSSDC ID- 78-103A-04 INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - R. GIACCONI SAO
OI - H. TANANBAUM SAO
OI - G.W. CLARK MASS INST OF TECH
OI - S.S. HOLT NASA-GSFC
OI - R. NOVICK COLUMBIA U

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS EXPERIMENT WERE (1) TO SURVEY X-RAY SOURCES OF AN EXTENDED NATURE IN THE ENERGY RANGE FROM 0.1 TO 4 KEV, WHERE RESOLUTION OF 1 ARC MIN WAS SUFFICIENT, (2) TO STUDY THE ANGULAR STRUCTURE OF EXTENDED SOURCES, (3) TO SURVEY FOR WEAK SOURCES, AND (4) TO LOCATE OBJECTS WITH POORLY KNOWN POSITIONS.

----- HEAD 2, GIACCONI-----

INVESTIGATION NAME- SOLID-STATE X-RAY DETECTOR

NSSDC ID- 78-103A-05 INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - R. GIACCONI SAO
OI - H. TANANBAUM SAO
OI - G.W. CLARK MASS INST OF TECH
OI - S.S. HOLT NASA-GSFC
OI - R. NOVICK COLUMBIA U

BRIEF DESCRIPTION
THIS INSTRUMENT WAS A COOLED SOLID-STATE SPECTROMETER AND WAS USED TO DETECT WEAK SOURCES AND WEAK SPECTRAL FEATURES OVER A BROAD BAND OF ENERGIES BY EMPLOYING A NONDISPERSIVE SPECTRAL TECHNIQUE. A LITHIUM-DRIFTED, SOLID-STATE DETECTOR WAS OPERATED AT A TEMPERATURE OF 120 K. THE PRIMARY DETECTOR WAS 6 MM IN DIAMETER AND WAS SURROUNDED BY TWO VETO GUARD COUNTERS. A TWO-STAGE SOLID CRYOGEN REFRIGERATOR WAS USED TO COOL THE DETECTOR. SPECTRAL MEASUREMENTS WERE MADE BETWEEN 0.5 AND 4 KEV, WITH A RESOLUTION FROM 120 TO 150 EV, FWHM AND AN EFFICIENCY GREATER THAN 0.9.

***** HELIOS-A*****

SPACECRAFT COMMON NAME- HELIOS-A
ALTERNATE NAMES- HELIO-A, PL-741A
HELIOS 1

NSSDC ID- 74-097A

LAUNCH DATE- 12/10/74
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

WEIGHT- 371.2 KG

SPONSORING COUNTRY/AGENCY
FED REP OF GERMANY
UNITED STATES

BMWF
NASA-OSS

ORBIT PARAMETERS

ORBIT TYPE- HELIOCENTRIC
ORBIT PERIOD- 190.15 DAYS
PERIAPSIS- 0.3095 AU RAD

EPOCH DATE- 01/16/75
INCLINATION- 0.02 DEG
APOAPSIS- 0.985 AU RAD

PERSONNEL

MG - F.D. KOCHENDORFER
SC - A.G. OPP
PM - A. KUTZER
PM - G.W. OUSLEY
PS - H. PORSCHKE
PS - J.H. TRAINOR

NASA HEADQUARTERS
NASA HEADQUARTERS
GES FUR WELTRAUMFORSCH
NASA-GSFC
DFVLR
NASA-GSFC

BRIEF DESCRIPTION

THIS SPACECRAFT WAS ONE OF A PAIR OF DEEP SPACE PROBES DEVELOPED BY THE FEDERAL REPUBLIC OF GERMANY (FRG) IN A COOPERATIVE PROGRAM WITH NASA. EXPERIMENTS WERE PROVIDED BY SCIENTISTS FROM BOTH FRG AND THE U.S. NASA SUPPLIED THE TITAN/CENTAUR LAUNCH VEHICLE. THE SPACECRAFT WAS EQUIPPED WITH TWO BOOMS AND A 32-M ELECTRIC DIPOLE. THE PAYLOAD CONSISTED OF A FLUXGATE MAGNETOMETER; ELECTRIC AND MAGNETIC WAVE EXPERIMENTS, WHICH COVERED VARIOUS BANDS IN THE FREQUENCY RANGE 6 HZ TO 3 MHZ; CHARGED PARTICLE EXPERIMENTS, WHICH COVERED VARIOUS ENERGY RANGES STARTING WITH SOLAR WIND THERMAL ENERGIES AND EXTENDING TO 1 GEV; A ZODICAL LIGHT EXPERIMENT; AND A MICROMETEOROID EXPERIMENT. THE PURPOSE OF THE MISSION WAS TO MAKE PIONEERING MEASUREMENTS OF THE INTERPLANETARY MEDIUM FROM THE VICINITY OF THE EARTH'S ORBIT TO 0.3 AU. THE SPIN AXIS WAS NORMAL TO THE ECLIPTIC, AND THE NOMINAL SPIN RATE WAS 1 RPS. THE OUTER SPACECRAFT SURFACE WAS DIELECTRIC, EFFECTIVELY (BECAUSE OF THE SHEATH POTENTIAL) RAISING THE LOW-ENERGY THRESHOLD FOR THE SOLAR WIND PLASMA EXPERIMENT TO AS HIGH AS 100 EV. ALSO, SHEATH-RELATED COUPLING CAUSED BY THE SPACECRAFT ANTENNAE PRODUCED INTERFERENCE WITH THE WAVE EXPERIMENTS. THE SPACECRAFT WAS CAPABLE OF BEING OPERATED AT BIT RATES FROM 4096 TO 8 BPS, VARIABLE BY FACTORS OF TWO. WHILE THE SPACECRAFT WAS MOVING TO PERIHELION, IT WAS GENERALLY OPERATED FROM 64 TO 256 BPS; AND NEAR 0.3 AU, IT WAS OPERATED AT THE HIGHEST BIT RATE. BECAUSE OF A DEPLOYMENT FAILURE OF ONE AXIS OF THE 32-M, TIP-TO-TIP, DIPOLE ANTENNA, ONE AXIS WAS SHORTED, CAUSING THE ANTENNA TO FUNCTION AS A MONOPOLE. THE MAJOR EFFECT OF THIS ANOMALY WAS TO INCREASE THE EFFECTIVE INSTRUMENT THRESHOLDS, AND TO INTRODUCE ADDITIONAL UNCERTAINTIES IN THE EFFECTIVE ANTENNA LENGTH. INSTRUMENT DESCRIPTIONS WRITTEN BY THE EXPERIMENTERS WERE PUBLISHED (SOME IN GERMAN, SOME IN ENGLISH) IN THE JOURNAL 'RAUMFAHRTFORSCHUNG', VOL. 19, NO. 5, SEPT. 1975.

NSSDC ID- 74-097A-04

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - D.A. GURNETT
OI - P.J. KELLOGG
OI - S.J. BAUER
OI - R.G. STONE

U OF IOWA
U OF MINNESOTA
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT (ESA) SHARED THE 32 M, TIP-TO-TIP ELECTRIC ANTENNA WITH EXPERIMENTS -05 AND -06. THE INSTRUMENT CONSISTED OF A 16-CHANNEL SPECTRUM ANALYZER WITH APPROXIMATELY LOGARITHMICALLY EQUISPACED CENTER FREQUENCIES, 16 LOG COMPRESSORS, 16 Q-C INTEGRATORS FOR AVERAGING THE LOG COMPRESSED ELECTRIC FIELD AMPLITUDE BETWEEN READOUTS, AND 16 PEAK DETECTORS WHICH WERE RESET AFTER READOUT. THE 16 AVERAGES AND 16 PEAK LOG VALUES WERE SAMPLED ALMOST SIMULTANEOUSLY. THE CHANNELS COVERED THE FREQUENCY RANGE OF ABOUT 20 HZ TO 200 KHZ, WITH FOUR CHANNELS PER DECADE OF FREQUENCY. THE LOG COMPRESSORS HAD A DYNAMIC RANGE OF 100 DB. SAMPLING RATE DEPENDED IN DETAIL ON THE SPACECRAFT BIT RATE AND TELEMETRY FORMAT. THE FASTEST REAL TIME TELEMETRED RATE WAS FOR 16 AVERAGES AND 16 PEAK VALUES TO BE SAMPLED EVERY 1.125 S. WHENEVER A VERY STRONG SIGNAL WAS DETECTED IN A PRE-SELECTED CHANNEL, THE SHOCK ALARM DATA MODE WAS INITIATED IN WHICH THE ELECTRIC FIELD SPECTRUM, MAGNETIC FIELD, AND PLASMA DATA WERE RECORDED INTO SPACECRAFT MEMORY FOR A PERIOD STARTING BEFORE AND TERMINATING AFTER THE TRIGGERING SIGNAL TIME. THE MAXIMUM SAMPLING RATE OF THE SPECTRUM DATA IN THIS MODE WAS 14.2 SAMPLES PER S FOR EACH CHANNEL. ONE HALF OF THE DIPOLE ANTENNA FAILED TO EXTEND PROPERLY AND WAS SHORT CIRCUITED TO THE SPACECRAFT GROUND. THE RESULTANT CONFIGURATION WAS THAT OF A MONOPOLE WHICH WAS CALCULATED TO HAVE AN EFFECTIVE LENGTH OF APPROXIMATELY 8 M. THE PRIMARY DETRIMENTAL EFFECTS WERE THE LOSS OF 6 DB IN E FIELD SENSITIVITY DUE TO THE SHORTENED ANTENNA AND THE INCREASE IN THE 178 KHZ CHANNEL BY 25 DB. SOLAR CELL AND SHEATH EFFECTS CAUSED INTERFERENCE IN THE LOWEST 6 CHANNELS (WHICH WAS LESS SEVERE WITH INCREASING CHANNEL FREQUENCY). FOR MORE DETAILS, SEE JGR, 82, P 632, 1975, AND P 245-247 OF 'RAUMFAHRTFORSCHUNG', 19, 5, SEPT./OCT. 1975.

----- HELIOS-A, GURNETT-----

INVESTIGATION NAME- FINE FREQUENCY, COARSE TIME RESOLUTION
SPECTRUM ANALYSIS

NSSDC ID- 74-097A-05

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - D.A. GURNETT
OI - P.J. KELLOGG
OI - S.J. BAUER
OI - R.G. STONE

U OF IOWA
U OF MINNESOTA
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT (ESB) SHARED THE 32 M, TIP-TO-TIP, ELECTRIC DIPOLE ANTENNA WITH EXPERIMENTS -04 AND -06. INSTRUMENTATION CONSISTED OF THREE TUNABLE PLASMA WAVE RECEIVERS, A FIXED-FREQUENCY WIDEBAND RECEIVER, AND A WAVE FORM SAMPLER. THE TUNABLE RECEIVERS AND WIDEBAND RECEIVER PROVIDED DATA FOR DIRECT TELEMETRY TO EARTH. THE DATA FROM THE WAVE FORM SAMPLER WERE STORED IN THE SPACECRAFT MEMORY FOR A SHORT PERIOD STARTING BEFORE AND ENDING AFTER THE SHOCK ALARM CIRCUIT HAD BEEN TRIGGERED. EACH OF THE TUNABLE RECEIVERS COVERED A DIFFERENT FREQUENCY BAND IN THE RANGE 1 HZ TO 200 KHZ. THE HIGH FREQUENCY RECEIVER HAD 96 FREQUENCY SETTINGS SEPARATED BY ABOUT 4 PERCENT AND COVERED THE FREQUENCY RANGE 6.4 KHZ TO 205 KHZ. THE MID-RANGE RECEIVER HAD 48 FREQUENCY SETTINGS SEPARATED BY ABOUT 8 PERCENT AND COVERED THE RANGE 208 HZ TO 6.07 KHZ. THE LOW-FREQUENCY RECEIVER HAD 24 SETTINGS WITH 15 PERCENT SEPARATION AND COVERED THE RANGE 11 HZ TO 309 HZ. THE RESPONSE TIME OF THE LOW-FREQUENCY RECEIVER WAS APPROXIMATELY 1 S, NECESSITATING THE INCLUSION OF THE WIDEBAND RECEIVER TO OBTAIN INFORMATION ABOUT THE ANGULAR DISTRIBUTION OF WAVES APPEARING IN THE LOW-FREQUENCY BAND. THIS RECEIVER COVERED THE FREQUENCY RANGE 1 HZ TO 200 HZ. THE TIME RESOLUTION DEPENDED IN DETAIL ON THE SPACECRAFT TELEMETRY FORMAT, BIT RATE, AND EXPERIMENT OPERATIONAL MODE. WHEN THE SHOCK ALARM MODE BECAME ACTIVATED, DATA FROM THE WAVE FORM SAMPLER WERE READ INTO SPACECRAFT MEMORY FOR A PERIOD STARTING BEFORE AND ENDING AFTER THE TRIGGERING EVENT. IN THIS MODE, THE INSTANTANEOUS VOLTAGE ACROSS THE ANTENNA WAS PASSED THROUGH A LOW PASS FILTER WITH CORNER FREQUENCY DEPENDENT ON THE SAMPLING RATE, AND MEASURED AT DISCRETE INTERVALS, THE MOST RAPID BEING 2.2 MS. ONE HALF OF THE ELECTRIC DIPOLE FAILED TO DEPLOY PROPERLY, AND BECAME SHORT CIRCUITED TO GROUND. THE RESULTING CONFIGURATION WAS THAT OF A MONOPOLE WITH AN OPERATIONAL EFFECTIVE LENGTH OF ABOUT 8 M. THIS RESULTED IN A 6 DB LOSS IN SENSITIVITY, AND AN INCREASED RECEIVER NOISE LEVEL, PARTICULARLY AT LOW FREQUENCIES. IN ADDITION, THE HIGH-GAIN TELEMETRY ANTENNA PRODUCED ADDITIONAL INTERFERENCE. FOR A MORE DETAILED DISCUSSION, SEE P 248 OF 'RAUMFAHRTFORSCHUNG', 19, 5, 1975.

----- HELIOS-A, FECHTIG-----

INVESTIGATION NAME- MICROMETEOROID DETECTOR AND ANALYZER

NSSDC ID- 74-097A-12

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY PHYSICS
INTERPLANETARY DUST

PERSONNEL

PI - H. FECHTIG
OI - J. WEHRAUCH

MPI-NUCLEAR PHYS
MPI-PHYS ASTROPHYS

BRIEF DESCRIPTION

THE PURPOSE OF THE EXPERIMENT (E10) WAS TO INVESTIGATE SOME THEORIES ABOUT THE INTERPLANETARY DUST INCLUDING WHETHER -- (1) THE NUMBER OF PARTICLES INCREASES TOWARD THE SUN, (2) THE CUTOFF FOR SMALL PARTICLES IS DEPENDENT ON THE DISTANCE FROM THE SUN, BECAUSE SOLAR PRESSURE INCREASES NEARER THE SUN, AND (3) THE NUMBER DENSITIES OF PARTICLES CHANGE NEAR THE ORBITS OF PLANETS. THE KINETIC ENERGY OF DUST PARTICLES HITTING A TARGET WITH HIGH VELOCITY (SEVERAL KM/S) CAUSED THE MATERIAL TO VAPORIZE AND BECOME PARTIALLY IONIZED. THE GENERATED PLASMA CLOUD WAS THEN SEPARATED BY APPROPRIATE VOLTAGES INTO ITS NEGATIVE (ELECTRON) PART AND INTO POSITIVE IONS. THE MASS AND THE ENERGY OF THE DUST PARTICLES WAS DETERMINED FROM THE IMPULSE HEIGHTS. A TIME-OF-FLIGHT MASS SPECTROMETER IN CONNECTION WITH THE TARGET ALLOWED THE SMALL ION CLOUD TO BE ANALYZED. IN THIS WAY THE INVESTIGATION OF THE CHEMICAL COMPOSITION OF THE DUST PARTICLES BECAME POSSIBLE. THE THRESHOLD FOR THE DETECTION OF A PARTICLE WAS ABOUT 1.E-15 G. MASS AND ENERGY DETERMINATION WAS POSSIBLE FOR PARTICLES LARGER THAN ABOUT 1.E-14 G. FOR PARTICLES LARGER THAN 1.E-13 G, A MASS SPECTRUM WAS GATHERED. FOR FURTHER DETAILS, SEE PP 268-269 OF 'RAUMFAHRTFORSCHUNG', 19, 5, SEPT./OCT. 1975.

----- HELIOS-A, GURNETT-----

INVESTIGATION NAME- COARSE FREQUENCY, FINE TIME RESOLUTION
SPECTRUM ANALYSIS

----- HELIOS-A, GURNETT-----

INVESTIGATION NAME- 50-KHZ TO 2-MHZ RADIO WAVE

NSSDC ID- 74-097A-06

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
RADIO PHYSICS
PARTICLES AND FIELDS
SOLAR PHYSICS

PERSONNEL

PI - D.A. GURNETT	U OF IOWA
OI - P.J. KELLOGG	U OF MINNESOTA
OI - R.R. WEBER	NASA-GSFC
OI - R.G. STONE	NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT (E5C) SHARED THE 32-M, TIP-TO-TIP, ELECTRIC DIPOLE ANTENNA WITH EXPERIMENTS -04 AND -05. A DUAL (REDUNDANT) 16-FREQUENCY CHANNEL RADIOMETER, WITH APPROXIMATELY LOGARITHMICALLY SPACED CHANNELS, WAS USED TO DETECT TYPE III RADIO EMISSIONS ASSOCIATED WITH SOLAR FLARE EVENTS IN THE FREQUENCY BAND 26.5 KHZ TO 3 MHZ. THE EXPERIMENT SAMPLING RATE WAS SYNCHRONIZED SUCH THAT EACH SPACECRAFT REVOLUTION WAS DIVIDED INTO 32 SECTORS. THE SEQUENCE AND FREQUENCY OF SAMPLING DEPENDED ON THE INSTRUMENT OPERATIONAL MODE (ONE OF FOUR) AND THE SPACECRAFT BIT RATE. THE MOST RAPID SAMPLING POSSIBLE FOR A SINGLE FREQUENCY CHANNEL WAS ONCE EVERY 1/32 OF A SATELLITE SPIN PERIOD, OR ABOUT .03 S. A TYPICAL SAMPLING SEQUENCE WAS FOR ONE FREQUENCY CHANNEL TO BE SAMPLED FOR 16 SECTORS (1/2 REVOLUTION), FOLLOWED BY THE NEXT. ONE-HALF OF THE 32-M DIPOLE FAILED TO EXTEND PROPERLY DURING DEPLOYMENT, AND WAS SHORTED TO GROUND. THE RESULTING ANTENNA CONFIGURATION WAS THAT OF A MONOPOLE WITH AN OPERATIONAL EFFECTIVE LENGTH OF 8 M. THIS SHORTER CONFIGURATION RESULTED IN INCREASED RADIO FREQUENCY INTERFERENCE (RFI) OF FROM 3 TO 30 DB, ABOVE EXPECTED LEVELS, AND A LOSS OF 6 DB IN GAIN. THE SECOND PROBLEM WAS UNEXPECTED INTERFERENCE BETWEEN THE HIGH-GAIN TELEMETRY ANTENNA. THIS ADDED 60 DB RFI AT 27.5 KHZ, DECREASING WITH INCREASING FREQUENCY, SO THAT ABOVE 200 KHZ IT PRODUCED NO DETECTABLE INTERFERENCE. FOR MORE DETAILS ABOUT THE INSTRUMENT AND MODES OF OPERATION, SEE P 250 OF "RAUMFAHRTFORSCHUNG," 19, 5, 1975.

----- HELIOS-A, KEPPLER-----

INVESTIGATION NAME- ENERGETIC ELECTRON DETECTOR

NSSDC ID- 74-097A-10

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - E. KEPPLER	MPI-ASTRONOMIE
OI - B. WILKEN	MPI-ASTRONOMIE
OI - D.J. WILLIAMS	NOAA-ERL

BRIEF DESCRIPTION

THE OBJECTIVE OF THE EXPERIMENT (E8) WAS TO STUDY THE ORIGIN AND THE DISTRIBUTION MECHANISM OF LOW-ENERGY ELECTRONS AND PROTONS. THE INSTRUMENT, A MAGNETIC SPECTROMETER, CONSISTED OF SIX SEMICONDUCTOR DETECTORS WITH APERTURES POINTING INTO THE PLANE OF THE ECLIPTIC. SPECIES SEPARATION WAS ACHIEVED BY AN INHOMOGENEOUS MAGNETIC FIELD ORIENTED PERPENDICULAR TO THE PARTICLE PATH. FOUR ELECTRON AND TWO PROTON DETECTORS MEASURED ELECTRONS FROM 20 TO 1000 KEV AND PROTONS FROM 80 TO 1000 KEV. THE PROTON MEASUREMENTS WERE MADE WITH A TWO-DETECTOR TELESCOPE EMPLOYING COINCIDENCE AND ANTICOINCIDENCE LOGICS. BOTH PARTICLE SPECIES WERE MEASURED IN 16 ENERGY CHANNELS THROUGH PULSE HEIGHT ANALYSIS. FOR FURTHER INFORMATION SEE PP 261-263 OF 'RAUMFAHRTFORSCHUNG,' 19, 5, SEPTEMBER/OCTOBER 1975.

----- HELIOS-A, KUNDT-----

INVESTIGATION NAME- CELESTIAL MECHANICS

NSSDC ID- 74-097A-14

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
CELESTIAL MECHANICS

PERSONNEL

PI - W. KUNDT	U OF HAMBURG
OI - W.G. MELBOURNE	NASA-JPL

BRIEF DESCRIPTION

THIS EXPERIMENT USED THE TRACKING DATA TO OBTAIN A DETAILED SPACECRAFT ORBIT AND IMPROVED KNOWLEDGE OF THE ORBITAL ELEMENTS OF THE EARTH-MOON SYSTEM AND GENERAL RELATIVITY PARAMETERS.

----- HELIOS-A, KUNOW-----

INVESTIGATION NAME- COSMIC-RAY PARTICLES

NSSDC ID- 74-097A-07

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - H. KUNOW	U OF KIEL
OI - G.H. WIBBERENZ	U OF KIEL
OI - G. GREEN	U OF KIEL
OI - M. MUELLER-MELLIN	U OF KIEL
OI - M. WITTE	U OF KIEL
OI - H. HEMPE	U OF KIEL

BRIEF DESCRIPTION

THE OBJECTIVE OF THE EXPERIMENT (E6) WAS TO STUDY HIGH-ENERGY, CHARGED, COSMIC-RAY PARTICLES OF SOLAR, PLANETARY, AND GALACTIC ORIGIN IN INTERPLANETARY SPACE. PROTONS AND ALPHA PARTICLES WITH ENERGIES .GT. 1.3 MEV/NUCLEON, AND ELECTRONS .GT. 0.3 MEV WERE MEASURED WITHIN INTERPLANETARY SPACE OVER THE RANGE FROM 0.3 TO 1.0 AU. THE INSTRUMENT, A PARTICLE TELESCOPE WITH A 55-DEG FIELD OF VIEW, CONSISTED OF FIVE SEMICONDUCTOR DETECTORS, ONE SAPPHIRE-CERENKOV COUNTER, AND ONE SCINTILLATION COUNTER, ALL ENCLOSED BY AN ANTICOINCIDENCE CYLINDER. THE TELESCOPE HAD BEEN CALIBRATED PRIOR TO LAUNCH USING RADIOACTIVE SOURCES, PARTICLE ACCELERATORS, AND GROUND-LEVEL MUONS. IT MEASURED PROTONS AND ALPHA PARTICLES IN SIX CHANNELS (1.3-3.3, 3.3-13, 13-27, 27-37, 37-45, AND .GT. 45 MEV/NUCLEON) AND ELECTRONS IN FIVE ENERGY CHANNELS (0.3-0.8, 0.8-2, 2-3, 3-4, AND .GT. 4 MEV). FOR MORE DETAIL SEE PP 253-257 OF 'RAUMFAHRTFORSCHUNG,' 19, 5, SEPTEMBER/OCTOBER 1975.

----- HELIOS-A, LEINERT-----

INVESTIGATION NAME- ZODIACAL LIGHT PHOTOMETER

NSSDC ID- 74-097A-11

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY PHYSICS
ZODIACAL LIGHT

PERSONNEL

PI - C. LEINERT	MPI-ASTRONOMIE
OI - E. PITZ	MPI-ASTRONOMIE

BRIEF DESCRIPTION

THIS EXPERIMENT (E9) CONSISTED OF THREE PHOTOMETERS LOOKING AT 15 DEG, 30 DEG, AND 90 DEG FROM THE ECLIPTIC. THESE PHOTOMETERS OBSERVED THE INTENSITY AND POLARIZATION OF THE ZODIACAL LIGHT IN UV, BLUE, AND VISUAL BANDS. THE PURPOSE OF THIS EXPERIMENT WAS TO OBTAIN INFORMATION ABOUT THE SPATIAL DISTRIBUTION, SIZE, AND NATURE OF INTERPLANETARY DUST PARTICLES. FOR FURTHER DETAILS, SEE PP 264-267 OF 'RAUMFAHRTFORSCHUNG,' 19, 5, SEPT./OCT. 1975.

----- HELIOS-A, NESS-----

INVESTIGATION NAME- FLUXGATE MAGNETOMETER FOR AVERAGE FIELDS

NSSDC ID- 74-097A-02

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - N.F. NESS	NASA-GSFC
OI - F. MARIANI	SPACE PLASMA LAB
OI - L.F. BURLAGA	NASA-GSFC
OI - S.C. CANTARANO	CNR, SPACE PLASMA LAB

BRIEF DESCRIPTION

THIS EXPERIMENT (E3) CONSISTED OF A BOOM-MOUNTED, TRIAXIAL-FLUXGATE MAGNETOMETER. AN AUTOMATIC IN-FLIGHT RANGE SWITCH SYSTEM SELECTED THE OPTIMUM OF FOUR RANGES THAT WERE MINUS TO PLUS 16, 48, 144, AND 432 NT PER SENSOR. THESE HAD CORRESPONDING DIGITIZATION RESOLUTIONS OF MINUS TO PLUS 0.03, 0.09, 0.28, AND 0.84 NT. A SENSOR FLIPPER WAS ACTUATED EVERY 36 H TO ASSIST IN SENSOR ZERO LEVEL DETERMINATION. FOR TELEMETRY BIT RATES ABOVE 256 BPS, VECTOR MEASUREMENTS WERE MADE AT RATES BETWEEN 1 AND 16 P/S, DEPENDING ON BIT RATES. AT LOWER BIT RATES, AVERAGES AND VARIANCES WERE COMPUTED ON BOARD FOR TRANSMISSION TO EARTH.

----- HELIOS-A, NEUBAUER-----

INVESTIGATION NAME- FLUXGATE MAGNETOMETER FOR FIELD FLUCTUATIONS

NSSDC ID- 74-097A-01

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - F.M. NEUBAUER
OI - A. MAIER

BRAUNSCHWEIG TECH U
BRAUNSCHWEIG TECH U

NSSDC ID- 74-097A-08

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS

BRIEF DESCRIPTION

THE INSTRUMENT (E2) CONSISTED OF A TRIAXIAL FLUXGATE MAGNETOMETER MOUNTED ON A 2.75-M BOOM TO MAKE MAGNETIC FIELD MEASUREMENTS UP TO 4 HZ. DATA FROM EACH AXIS WERE FIRST SENT THROUGH A LOW-PASS FILTER WITH THE 3 DB ATTENUATION POINT AT 4 HZ. DEPENDING ON THE TELEMETRY FORMAT AND BIT RATE, THE DATA WERE FED EITHER INTO A TIME-AVERAGING COMPUTER OR DIRECTLY CONNECTED TO TELEMETRY. A SHOCK IDENTIFICATION COMPUTER TRIGGERED THE STORAGE OF RAPID RATE DATA IN THE SPACECRAFT MEMORY WHEN THERE WERE DISCONTINUITIES IN THE VARIATIONS OF THE AMBIENT MAGNETIC FIELD. TWO MEASUREMENT RANGES WERE USED, PLUS OR MINUS 100 AND 400 NT WITH RESOLUTIONS OF PLUS OR MINUS 0.2 AND 0.8 NT, RESPECTIVELY. THE INSTRUMENT WAS EQUIPPED WITH A FLIPPER MECHANISM, WHICH RE-ORIENTED EACH SENSOR BY 90 DEG PERIODICALLY. FOR DETAILED INFORMATION, SEE P 232 OF "RAUMFAHRTFORSCHUNG," 19, 5, 1975.

----- HELIOS-A, NEUBAUER-----

INVESTIGATION NAME- SEARCH COIL MAGNETOMETER

NSSDC ID- 74-097A-03

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - F.M. NEUBAUER
OI - G. DENMEL

BRAUNSCHWEIG TECH U
BRAUNSCHWEIG TECH U

BRIEF DESCRIPTION

THIS EXPERIMENT (E4) WAS DESIGNED TO INVESTIGATE THE MAGNETIC COMPONENT OF ELECTROMAGNETIC WAVES IN THE SOLAR WIND FROM 0.3 TO 1.0 AU. BY MEANS OF ITS WAVEFORM CHANNEL (WFC) THE RAPID VARIATIONS OF THE MAGNETIC FIELD WERE MEASURED UP FROM PLUS OR MINUS 8.75 NT TO PLUS OR MINUS 275 NT IN THREE ORTHOGONAL DIRECTIONS FROM 4 TO 128 HZ. A SPECTRUM ANALYZER OBSERVED THE FIELD COMPONENTS IN THE ECLIPTIC PLANE AND PERPENDICULAR TO IT, TO OBTAIN THE POWER SPECTRAL DENSITY AND PEAK VALUES FOR EIGHT LOGARITHMICALLY SPACED CHANNELS IN THE RANGE FROM 4.7 TO 2200 HZ. BECAUSE OF THE LARGE AMOUNT OF DATA PRODUCED BY THIS EXPERIMENT, AN ADAPTIVE DATA REDUCTION WAS APPLIED. FOR INTERESTING TIME INTERVALS SELECTED BY THE FLUXGATE MAGNETOMETER (NEUBAUER) OR GURNETT (-04), WAVEFORM DATA COULD BE READ INTO AN ON-BOARD MEMORY AT A RAPID RATE TO BE TRANSMITTED SLOWLY AFTERWARDS. FOR MORE DETAILED INFORMATION SEE P 241 IN "RAUMFAHRTFORSCHUNG," 19, 5, 1975.

----- HELIOS-A, ROSENBAUER-----

INVESTIGATION NAME- PLASMA DETECTORS

NSSDC ID- 74-097A-09

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - H.R. ROSENBAUER
OI - H. PELLKOEFER
OI - J.H. WOLFE

MPI-AERONOMY
MPI-EXTRATERR PHYS
NASA-ARC

BRIEF DESCRIPTION

THIS EXPERIMENT (E1) EMPLOYED THREE PLASMA ANALYZERS FOR POSITIVE IONS AND ONE FOR ELECTRONS. ALL DETECTORS WERE MOUNTED NORMAL TO THE SPIN AXIS. POSITIVE IONS WITH ENERGY PER CHARGE WITHIN THE RANGE 0.155 TO 15.32 KEV/Q WERE MEASURED IN TWO ANGULAR DIMENSIONS USING A COMBINATION OF A HEMISPHERICAL, A QUADRISPHERICAL, AND A SINUSOIDALLY SHAPED ELECTROSTATIC ANALYZER. ELECTRONS WITH ENERGY FROM 0.5 TO 1660 EV WERE MEASURED WITH A HEMISPHERICAL ELECTROSTATIC ANALYZER IN ONE DIMENSION. THE EXPERIMENT OPERATED IN SEVERAL MODES WITH DIFFERING TIME RESOLUTION DEPENDING IN DETAIL ON TELEMETRY FORMAT AND SATELLITE BIT RATE. TYPICAL TIME RESOLUTION WAS ON THE ORDER OF A MINUTE. ALSO, WHENEVER THE SPECIAL SHOCK ALARM MODE WAS TRIGGERED BY EXPERIMENTS -04 OR -01, HIGH TIME RESOLUTION PLASMA DATA WAS RECORDED INTO SPACECRAFT MEMORY FOR LATER TRANSMISSION. BECAUSE THE SPACECRAFT BODY WAS DIELECTRIC, SHEATH POTENTIALS OF UP TO 100 EV DEGRADED THE USEFULNESS OF DATA TAKEN IN THE LOWER ELECTRON ENERGY CHANNELS. THIS PHENOMENON WAS JUDGED TO HAVE MINIMAL EFFECTS OF THE USEFULNESS OF THE ION DATA. FOR MORE DETAILED INFORMATION SEE P 226 OF "RAUMFAHRTFORSCHUNG," 19, 5, 1975. WHEN AN EVENT WAS DETECTED BY EXPERIMENT -04, A SHOCK ALARM MODE OF OPERATION WAS ENTERED IN WHICH FAST TIME RESOLUTION DATA WERE RECORDED INTO ONBOARD STORAGE MEMORY FOR A PERIOD BEFORE AND AFTER THE EVENT.

----- HELIOS-A, TRAINOR-----

INVESTIGATION NAME- GALACTIC AND SOLAR COSMIC RAYS

PERSONNEL

PI - J.H. TRAINOR
OI - E.C. ROELOF
OI - B.J. TEEGARDEN
OI - F.B. McDONALD
OI - K.G. MCCracken

NASA-GSFC
APPLIED PHYSICS LAB
NASA-GSFC
NASA-GSFC
CSIRO

BRIEF DESCRIPTION

THE DETECTOR COMPLEMENT OF THIS EXPERIMENT (E7) CONSISTED OF THREE SEPARATE DELTA E/DELTA X VS E TELESCOPES AND A PROPORTIONAL COUNTER FOR MONITORING SOLAR X RAYS IN THE RANGE 2-8 KEV. THE HIGH ENERGY TELESCOPE HAD A GEOMETRIC FACTOR OF 0.22 SQ CM-SR AND MEASURED ELECTRONS IN THREE RANGES BETWEEN 2 AND 8 MEV, AND PROTONS AND ALPHA PARTICLES IN THREE RANGES BETWEEN 20 AND 56 MEV/N. PROTONS ABOVE 230 MEV ARE ALSO MEASURED. THE FIRST LOW-ENERGY TELESCOPE (GEOMETRIC FACTOR WAS 0.155 SQ CM-SR) MEASURED PROTONS AND Z > 1 PARTICLES IN THREE RANGES BETWEEN 3 AND 21 MEV/N. THE SECOND LOW-ENERGY TELESCOPE (GEOMETRIC FACTOR WAS 0.015 SQ CM-SR) MEASURED PROTONS IN SEVERAL RANGES BETWEEN 0.12 AND 2.1 MEV, ALPHA PARTICLES IN THE RANGES 0.6-2.1 AND 6-21.2 MEV/N, AND ELECTRONS IN FOUR RANGES BETWEEN 0.12 AND 2 MEV. FOR A NUMBER OF COINCIDENCE MODES, COUNTING DATA SECTORED INTO EIGHT 45 DEG SECTORS WERE OBTAINED. THE DATA CYCLE TIME WAS DEPENDENT ON THE SPACECRAFT TELEMETRY RATE (VARIABLE BETWEEN 4096 AND 8 BITS/S) AND FORMAT. UNDER OPTIMUM CONDITIONS, FIVE EVENTS PER SECOND WERE PULSE HEIGHT ANALYZED AND THE RATE DATA CYCLE IS OF THE ORDER OF 5 MINUTES. AT THE SLOWEST COMBINATION OF BIT RATE AND FORMAT, A COMPLETE DATA CYCLE REQUIRES ABOUT 2.5 HOURS. SEE "IEEE TRANS. ON NUC. SCI.," NS-22, 570, 1975, AND "RAUMFAHRTFORSCHUNG," 19, 5, PP 258-260, 1975, FOR FURTHER DETAILS.

***** HELIOS-B*****

SPACECRAFT COMMON NAME- HELIOS-B
ALTERNATE NAMES- HELIO-B, PL-751A
HELIOS 2

NSSDC ID- 76-003A

LAUNCH DATE- 01/15/76 WEIGHT- 371.2 KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY

FED REP OF GERMANY
UNITED STATES

BMWF
NASA-OSS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- HELIOCENTRIC
ORBIT PERIOD- 185.6 DAYS
PERIAPSIS- 0.289 AU RAD

EPOCH DATE- 07/21/76
INCLINATION- 0. DEG
APOAPSIS- 0.983 AU RAD

PERSONNEL

MG - F.D. KOCHENDORFER
SC - A.G. OPP
PM - A. KUTZER
PM - G.W. QUSLEY
PS - H. PORSCHKE
PS - J.H. TRAINOR

NASA HEADQUARTERS
NASA HEADQUARTERS
GES FUR WELTRAUMFORSCH
NASA-GSFC
DFVLR
NASA-GSFC

BRIEF DESCRIPTION

THIS SPACECRAFT WAS ONE OF A PAIR OF DEEP SPACE PROBES DEVELOPED BY THE FEDERAL REPUBLIC OF GERMANY (FRG) IN A COOPERATIVE PROGRAM WITH NASA. EXPERIMENTS WERE PROVIDED BY SCIENTISTS FROM BOTH FRG AND THE U.S. NASA SUPPLIED THE TITAN/CENTAUR LAUNCH VEHICLE. THE SPACECRAFT WERE EQUIPPED WITH TWO BOOMS AND A 32-M ELECTRIC DIPOLE. THE PAYLOAD CONSISTED OF A FLUXGATE MAGNETOMETER; ELECTRIC AND MAGNETIC WAVE EXPERIMENTS, WHICH COVERED VARIOUS BANDS IN THE FREQUENCY RANGE 6 HZ TO 3 MHZ; CHARGED PARTICLE EXPERIMENTS, WHICH COVERED VARIOUS ENERGY RANGES STARTING WITH SOLAR WIND THERMAL ENERGIES AND EXTENDING TO 1 GEV; A ZODIACAL LIGHT EXPERIMENT; AND A MICROMETEOROID EXPERIMENT. THE PURPOSE OF THE MISSION WAS TO MAKE PIONEERING MEASUREMENTS OF THE INTERPLANETARY MEDIUM FROM THE VICINITY OF THE EARTH'S ORBIT TO 0.3 AU. THE SPACECRAFT WAS SPIN STABILIZED WITH THE SPIN AXIS NORMAL TO THE ECLIPTIC, AND A NOMINAL SPIN RATE OF 1 RPS. THE OUTER SURFACE WAS COATED WITH A CONDUCTIVE MATERIAL, RESULTING IN A PLASMA SHEATH POTENTIAL OF TYPICALLY 5 EV. SHEATH-RELATED COUPLING CAUSED BY THE SPACECRAFT ANTENNAE PRODUCED INTERFERENCE WITH THE WAVE EXPERIMENTS, BUT THE CHARACTER OF THE INTERFERENCE WAS DIFFERENT THAN THAT OBSERVED ON THE HELIOS 1 SPACECRAFT. THE SPACECRAFT WAS CAPABLE OF BEING OPERATED AT BIT RATES OF FROM 4096 TO 8 BPS, VARIABLE BY FACTORS OF TWO. WHILE THE SPACECRAFT WAS MOVING TO PERHELION, IT WAS GENERALLY OPERATED FROM 64 TO 256 BPS; AND NEAR 0.3 AU, IT WAS OPERATED AT HIGHER BIT RATES. BECAUSE OF DIFFICULTY ENCOUNTERED WITH THE HIGH GAIN ANTENNA, AND SCHEDULING CONFLICTS WITH VIKING, RELATIVELY LESS HIGH BIT RATE DATA WAS OBTAINED FROM HELIOS-B THAN WAS AVAILABLE FROM HELIOS-A. INSTRUMENT DESCRIPTIONS WRITTEN BY THE EXPERIMENTERS ARE PUBLISHED (SOME IN GERMAN, SOME IN ENGLISH) IN THE JOURNAL "RAUMFAHRTFORSCHUNG," VOL. 19, NO. 5, SEPT./OCT., 1975.

----- HELIOS-B, FECHTIG-----

INVESTIGATION NAME- MICROMETEOROID DETECTOR AND ANALYZER

NSSDC ID- 76-003A-12

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST
INTERPLANETARY PHYSICS

PERSONNEL

PI - H. FECHTIG MPI-NUCLEAR PHYS
OI - J. WEINRAUCH MPI-PHYS ASTROPHYS

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT (E10) WAS TO INVESTIGATE SOME THEORIES ABOUT THE INTERPLANETARY DUST INCLUDING WHETHER -- (1) THE NUMBER OF PARTICLES INCREASES TOWARD THE SUN, (2) THE CUTOFF FOR SMALL PARTICLES IS DEPENDENT ON THE DISTANCE FROM THE SUN, BECAUSE SOLAR PRESSURE INCREASES NEARER THE SUN, AND (3) THE NUMBER DENSITIES OF PARTICLES CHANGE NEAR THE ORBITS OF PLANETS. THE DETECTOR UTILIZED THE FACT THAT THE KINETIC ENERGY OF DUST PARTICLES HITTING A TARGET WITH HIGH VELOCITY (SEVERAL KM/S) CAUSES THE MATERIAL TO VAPORIZE AND BECOME PARTIALLY IONIZED. THE GENERATED PLASMA CLOUD WAS SEPARATED BY APPROPRIATE VOLTAGES INTO ITS NEGATIVE (ELECTRON) PART AND INTO POSITIVE IONS. FROM THE IMPULSE HEIGHTS, THE MASS AND THE ENERGY OF THE DUST PARTICLES WAS DETERMINED. A TIME-OF-FLIGHT MASS SPECTROMETER IN CONNECTION WITH THE TARGET ALLOWED THE SMALL ION CLOUD TO BE ANALYZED, MAKING POSSIBLE THE INVESTIGATION OF THE CHEMICAL COMPOSITION OF THE DUST PARTICLES. THE THRESHOLD FOR THE DETECTION OF A PARTICLE WAS ABOUT 1.E-15 G. MASS AND ENERGY DETERMINATION WAS POSSIBLE FOR PARTICLES LARGER THAN ABOUT 1.E-14 G. FOR PARTICLES LARGER THAN 1.E-13 G, A MASS SPECTRUM MAY BE GATHERED. FOR FURTHER DETAILS, SEE PP 268-269 OF 'RAUMFAHRTFORSCHUNG', 19, 5, SEPT./OCT. 1975.

----- HELIOS-B, GURNETT-----

INVESTIGATION NAME- COARSE FREQUENCY, FINE TIME RESOLUTION
SPECTRUM ANALYSIS

NSSDC ID- 76-003A-04

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - D.A. GURNETT U OF IOWA
OI - P.J. KELLOGG U OF MINNESOTA
OI - S.J. BAUER NASA-GSFC
OI - R.G. STONE NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT (E5A) SHARED THE 32-M, TIP-TO-TIP, ELECTRIC ANTENNA WITH EXPERIMENTS -05 AND -06. THE INSTRUMENT CONSISTED OF A 16 CHANNEL SPECTRUM ANALYZER WITH APPROXIMATELY LOGARITHMICALLY EQUISPACED CENTER FREQUENCIES, 16 LOG COMPRESSORS, 16 R-C INTEGRATORS FOR AVERAGING THE LOG COMPRESSED ELECTRIC FIELD AMPLITUDE BETWEEN READOUTS, AND 16 PEAK DETECTORS WHICH WERE RESET AFTER READOUT. THE 16 AVERAGES AND 16 PEAK LOG VALUES WERE SAMPLED ALMOST SIMULTANEOUSLY. THE CHANNELS COVERED THE FREQUENCY RANGE OF ABOUT 20 HZ TO 200 KHZ, WITH FOUR CHANNELS PER DECADE OF FREQUENCY. THE LOG COMPRESSORS HAD A DYNAMIC RANGE OF 100 DB. SAMPLING RATE DEPENDED IN DETAIL ON THE SPACECRAFT BIT RATE AND TELEMETRY FORMAT. THE FASTEST REAL TIME TELEMETRED RATE WAS FOR 16 AVERAGES AND 16 PEAK VALUES TO BE SAMPLED EVERY 1.125 S. WHENEVER A VERY STRONG SIGNAL WAS DETECTED IN A PRE-SELECTED CHANNEL, THE SHOCK ALARM DATA MODE WAS INITIATED IN WHICH THE ELECTRIC FIELD SPECTRUM, MAGNETIC FIELD, AND PLASMA DATA WERE RECORDED INTO SPACECRAFT MEMORY FOR A PERIOD STARTING BEFORE AND TERMINATING AFTER THE TRIGGERING SIGNAL TIME. THE MAXIMUM SAMPLING RATE OF THE SPECTRUM DATA IN THIS MODE WAS 14.2 SAMPLES PER S FOR EACH CHANNEL. INTERFERENCE, CAUSED BY SOLAR CELL NOISE, OCCURRED PRIMARILY IN THE LOWEST SIX CHANNELS, AND HARMONICS RELATED TO THE SPIN FREQUENCY AND THE SPACECRAFT SHEATH. HOWEVER, A COMBINATION OF FACTORS, INCLUDING THE PROPER DEPLOYMENT OF THE DIPOLE ANTENNA AND THE CONDUCTIVE SPACECRAFT COATING, RESULTED IN DATA FROM THIS SPACECRAFT BEING OF HIGHER QUALITY THAN DATA FROM HELIOS-A. FOR FURTHER DETAILS, SEE PP 245-247 OF 'RAUMFAHRTFORSCHUNG', 19, 5, 1975.

----- HELIOS-B, GURNETT-----

INVESTIGATION NAME- FINE FREQUENCY, COARSE TIME RESOLUTION
SPECTRUM ANALYSIS

NSSDC ID- 76-003A-05

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - D.A. GURNETT U OF IOWA
OI - P.J. KELLOGG U OF MINNESOTA
OI - S.J. BAUER NASA-GSFC
OI - R.G. STONE NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT (E5B) SHARED THE 32-M, TIP-TO-TIP, ELECTRIC DIPOLE ANTENNA WITH EXPERIMENTS -04 AND -06. INSTRUMENTATION CONSISTED OF THREE TUNABLE PLASMA WAVE RECEIVERS, A FIXED-FREQUENCY WIDEBAND RECEIVER, AND A WAVE FORM SAMPLER. THE TUNABLE RECEIVERS AND WIDEBAND RECEIVER PROVIDED DATA FOR DIRECT TELEMETRY TO EARTH. THE DATA FROM THE WAVE FORM SAMPLER WERE STORED IN THE SPACECRAFT MEMORY FOR A SHORT PERIOD STARTING BEFORE AND ENDING AFTER THE SHOCK ALARM CIRCUIT HAD BEEN TRIGGERED. EACH OF THE TUNABLE RECEIVERS COVERED A DIFFERENT FREQUENCY BAND IN THE RANGE 1 HZ TO 200 KHZ. THE HIGH FREQUENCY RECEIVER HAD 96 FREQUENCY SETTINGS SEPARATED BY ABOUT 4 PERCENT AND COVERED THE FREQUENCY RANGE 6.4 KHZ TO 205 KHZ. THE MID-RANGE RECEIVER HAD 48 FREQUENCY SETTINGS SEPARATED BY ABOUT 8 PERCENT AND COVERED THE RANGE 208 HZ TO 6.07 KHZ. THE LOW-FREQUENCY RECEIVER HAD 24 SETTINGS WITH 15 PERCENT SEPARATION AND COVERED THE RANGE 11 HZ TO 309 HZ. THE RESPONSE TIME OF THE LOW-FREQUENCY RECEIVER WAS APPROXIMATELY 1 S, NECESSITATING THE INCLUSION OF THE WIDEBAND RECEIVER TO OBTAIN INFORMATION ABOUT THE ANGULAR DISTRIBUTION OF WAVES APPEARING IN THE LOW-FREQUENCY BAND. THIS RECEIVER COVERED THE FREQUENCY RANGE 1 HZ TO 200 HZ. THE TIME RESOLUTION DEPENDED IN DETAIL ON THE SPACECRAFT TELEMETRY FORMAT, BIT RATE, AND EXPERIMENT OPERATIONAL MODE. WHEN THE SHOCK ALARM MODE BECAME ACTIVATED, DATA FROM THE WAVE FORM SAMPLER WERE READ INTO SPACECRAFT MEMORY FOR A PERIOD STARTING BEFORE AND ENDING AFTER THE TRIGGERING EVENT. IN THIS MODE, THE INSTANTANEOUS VOLTAGE ACROSS THE ANTENNA WAS PASSED THROUGH A LOW PASS FILTER WITH CORNER FREQUENCY DEPENDENT ON THE SAMPLING RATE, AND MEASURED AT DISCRETE INTERVALS, THE MOST RAPID BEING 2.2 MS. FOR A MORE DETAILED DISCUSSION SEE P 248 OF 'RAUMFAHRTFORSCHUNG', 19, 5, 1975.

----- HELIOS-B, GURNETT-----

INVESTIGATION NAME- 50-KHZ TO 2-MHZ RADIO WAVE

NSSDC ID- 76-003A-06

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - D.A. GURNETT U OF IOWA
OI - P.J. KELLOGG U OF MINNESOTA
OI - R.R. WEBER NASA-GSFC
OI - R.G. STONE NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT (E5C) SHARED THE 32-M, TIP-TO-TIP, ELECTRIC DIPOLE ANTENNA WITH EXPERIMENTS -04 AND -05. A DUAL (REDUNDANT) 16-FREQUENCY CHANNEL RADIOMETER, WITH APPROXIMATELY LOGARITHMICALLY SPACED CHANNELS, WAS USED TO DETECT TYPE III RADIO EMISSIONS ASSOCIATED WITH SOLAR FLARE EVENTS IN THE FREQUENCY BAND 26.5 KHZ TO 3 MHZ. THE EXPERIMENT SAMPLING RATE WAS SYNCHRONIZED SUCH THAT EACH SPACECRAFT REVOLUTION WAS DIVIDED INTO 32 SECTORS. THE SEQUENCE AND FREQUENCY OF SAMPLING DEPENDED ON THE INSTRUMENT OPERATIONAL MODE (ONE OF FOUR) AND THE SPACECRAFT BIT RATE. THE MOST RAPID SAMPLING POSSIBLE FOR A SINGLE FREQUENCY CHANNEL WAS ONCE EVERY 1/32 OF A SATELLITE SPIN PERIOD, OR ABOUT .03 S. A TYPICAL SAMPLING SEQUENCE WAS FOR ONE FREQUENCY CHANNEL TO BE SAMPLED FOR 16 SECTORS (1/2 REVOLUTION), FOLLOWED BY THE NEXT. FOR MORE DETAILS ABOUT THE INSTRUMENT AND MODES OF OPERATION, SEE P 250 OF 'RAUMFAHRTFORSCHUNG', 19, 5, 1975.

----- HELIOS-B, KEPPLER-----

INVESTIGATION NAME- ENERGETIC ELECTRON DETECTOR

NSSDC ID- 76-003A-10

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - E. KEPPLER MPI-AERONOMY
OI - B. WILKEN MPI-AERONOMY
OI - D.J. WILLIAMS NOAA-ERL

BRIEF DESCRIPTION

THE OBJECTIVE OF THE EXPERIMENT (E8) WAS TO STUDY THE ORIGIN AND THE DISTRIBUTION MECHANISM OF LOW-ENERGY ELECTRONS AND PROTONS. THE INSTRUMENT, A MAGNETIC SPECTROMETER, CONSISTED OF SIX SEMICONDUCTOR DETECTORS WITH APERTURES POINTING INTO THE PLANE OF THE ECLIPTIC. SPECIES SEPARATION WAS ACHIEVED BY AN INHOMOGENEOUS MAGNETIC FIELD ORIENTED PERPENDICULAR TO THE PARTICLE PATH. FOUR ELECTRON AND TWO PROTON DETECTORS MEASURED ELECTRONS FROM 20 TO 1000 KEV AND PROTONS FROM 80 TO 1000 KEV. THE PROTON MEASUREMENTS WERE MADE WITH A TWO-DETECTOR TELESCOPE EMPLOYING COINCIDENCE AND ANTICOINCIDENCE LOGICS. BOTH PARTICLE SPECIES WERE MEASURED IN 16 ENERGY CHANNELS THROUGH PULSE HEIGHT ANALYSIS. FOR FURTHER INFORMATION SEE PP 261-263 OF 'RAUMFAHRTFORSCHUNG', 19, 5, SEPTEMBER/OCTOBER 1975.

----- HELIOS-B, KUNDI-----

INVESTIGATION NAME- CELESTIAL MECHANICS

NSSDC ID- 76-003A-14

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
CELESTIAL MECHANICS
ASTRONOMY

PERSONNEL

PI - W. KUNDT
OI - W.G. MELBOURNE

U OF HAMBURG
NASA-JPL

BRIEF DESCRIPTION

THIS EXPERIMENT USED THE TRACKING DATA TO OBTAIN A DETAILED SPACECRAFT ORBIT AND TO OBTAIN IMPROVED KNOWLEDGE OF THE ORBITAL ELEMENTS OF THE EARTH-MOON SYSTEM AND GENERAL RELATIVITY PARAMETERS.

----- HELIOS-B, KUNOW-----

INVESTIGATION NAME- COSMIC-RAY PARTICLES

NSSDC ID- 76-003A-07

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - H. KUNOW
OI - G.H. WIBBERENZ
OI - G. GREEN
OI - M. MUELLER-MELLIN
OI - M. WITTE
OI - H. HEMPE

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U OF KIEL

BRIEF DESCRIPTION

THE OBJECTIVE OF THE EXPERIMENT (E6) WAS TO STUDY HIGH-ENERGY, CHARGED, COSMIC-RAY PARTICLES OF SOLAR, PLANETARY, AND GALACTIC ORIGIN IN INTERPLANETARY SPACE. PROTONS AND ALPHA PARTICLES WITH ENERGIES .GT. 1.3 MEV/NUCLEON, AND ELECTRONS .GT. 0.3 MEV WERE MEASURED WITHIN INTERPLANETARY SPACE OVER THE RANGE FROM 0.3 TO 1.0 AU. THE INSTRUMENT, A PARTICLE TELESCOPE WITH A 55-DEG FIELD OF VIEW, CONSISTED OF FIVE SEMICONDUCTOR DETECTORS, ONE SAPPHIRE-CERENKOV COUNTER, AND ONE SCINTILLATION COUNTER, ALL ENCLOSED BY AN ANTICINCIDENCE CYLINDER. THE TELESCOPE HAD BEEN CALIBRATED PRIOR TO LAUNCH USING RADIOACTIVE SOURCES, PARTICLE ACCELERATORS, AND GROUND-LEVEL MUONS. IT MEASURED PROTONS AND ALPHA PARTICLES IN SIX CHANNELS (1.3-3.3, 3.3-13, 13-27, 27-37, 37-45, AND .GT. 45 MEV/NUCLEON) AND ELECTRONS IN FIVE ENERGY CHANNELS (0.3-0.8, 0.8-2, 2-3, 3-4, AND .GT. 4 MEV). FOR MORE DETAIL SEE PP 253-257 OF 'RAUMFAHRTFORSCHUNG', 19, 5, SEPTEMBER/OCTOBER 1975.

----- HELIOS-B, LEINERT-----

INVESTIGATION NAME- ZODIACAL LIGHT PHOTOMETER

NSSDC ID- 76-003A-11

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY PHYSICS
ZODIACAL LIGHT

PERSONNEL

PI - C. LEINERT
OI - E. PITZ

MPI-ASTRONOMIE
MPI-ASTRONOMIE

BRIEF DESCRIPTION

THIS EXPERIMENT (E9) CONSISTED OF THREE PHOTOMETERS LOOKING AT 15 DEG, 30 DEG, AND 90 DEG FROM THE ECLIPTIC. THESE PHOTOMETERS OBSERVED THE INTENSITY AND POLARIZATION OF THE ZODIACAL LIGHT IN UV, BLUE, SELECTED VISUAL BANDS, AND WHITE LIGHT. THE PURPOSE OF THIS EXPERIMENT WAS TO OBTAIN INFORMATION ABOUT THE SPATIAL DISTRIBUTION, SIZE, AND NATURE OF INTERPLANETARY DUST PARTICLES. FOR FURTHER DETAILS, SEE PP 264-267 OF 'RAUMFAHRTFORSCHUNG', 19, 5, SEPT./OCT. 1975.

----- HELIOS-B, NESS-----

INVESTIGATION NAME- FLUXGATE MAGNETOMETER FOR AVERAGE FIELDS

NSSDC ID- 76-003A-02

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - N.F. NESS
OI - F. MARIANI
OI - L.F. BURLAGA
OI - S.C. CANTARANO

NASA-GSFC
SPACE PLASMA LAB
NASA-GSFC
CNR, SPACE PLASMA LAB

BRIEF DESCRIPTION

THIS EXPERIMENT (E3) CONSISTED OF A BOOM-MOUNTED TRIAXIAL-FLUXGATE MAGNETOMETER. AN AUTOMATIC IN-FLIGHT RANGE SWITCH SYSTEM SELECTED THE OPTIMUM OF FOUR RANGES THAT ARE MINUS TO PLUS 16, 48, 144, AND 432 NT PER SENSOR. THESE HAD CORRESPONDING DIGITIZATION RESOLUTIONS OF MINUS TO PLUS 0.03, 0.09, 0.28, AND 0.84 NT. A SENSOR FLIPPER WAS ACTUATED EVERY 36 H TO ASSIST IN SENSOR ZERO LEVEL DETERMINATION. FOR TELEMETRY BIT RATES ABOVE 256 BPS, VECTOR MEASUREMENTS WERE MADE AT RATES BETWEEN 1 AND 16 PER S, DEPENDING ON BIT RATES. AT LOWER BIT RATES, AVERAGES AND VARIANCES WERE COMPUTED ON BOARD FOR TRANSMISSION TO EARTH. FOR FURTHER DETAILS, SEE PP 237-240 OF 'RAUMFAHRTFORSCHUNG', 19, 5, SEPT./OCT. 1975.

----- HELIOS-B, NEUBAUER-----

INVESTIGATION NAME- FLUXGATE MAGNETOMETER FOR FIELD FLUCTUATIONS

NSSDC ID- 76-003A-01

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - F.M. NEUBAUER
OI - A. MAIER

BRAUNSCHWEIG TECH U
BRAUNSCHWEIG TECH U

BRIEF DESCRIPTION

THE INSTRUMENT (E2) CONSISTED OF A TRIAXIAL FLUXGATE MAGNETOMETER MOUNTED ON A 2.75-M BOOM TO MAKE MAGNETIC FIELD MEASUREMENTS UP TO 4 HZ. DATA FROM EACH AXIS WERE FIRST SENT THROUGH A LOW-PASS FILTER WITH THE 3 DB ATTENUATION POINT AT 4 HZ. DEPENDING ON THE TELEMETRY FORMAT AND BIT RATE, THE DATA WERE FED EITHER INTO A TIME-AVERAGING COMPUTER OR DIRECTLY CONNECTED TO TELEMETRY. A SHOCK IDENTIFICATION COMPUTER TRIGGERED THE STORAGE OF RAPID RATE DATA IN THE SPACECRAFT MEMORY WHEN THERE WERE DISCONTINUITIES IN THE VARIATIONS OF THE AMBIENT MAGNETIC FIELD. TWO MEASUREMENT RANGES WERE USED, PLUS OR MINUS 100 AND 400 NT WITH RESOLUTIONS OF PLUS OR MINUS 0.2 AND 0.8 NT, RESPECTIVELY. THE INSTRUMENT WAS EQUIPPED WITH A FLIPPER MECHANISM, WHICH RE-ORIENTED EACH SENSOR BY 90 DEG PERIODICALLY. FOR DETAILED INFORMATION, SEE P 232 OF 'RAUMFAHRTFORSCHUNG', 19, 5, 1975.

----- HELIOS-B, NEUBAUER-----

INVESTIGATION NAME- SEARCH COIL MAGNETOMETER

NSSDC ID- 76-003A-03

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - F.M. NEUBAUER
OI - G. DEHMEL

BRAUNSCHWEIG TECH U
BRAUNSCHWEIG TECH U

BRIEF DESCRIPTION

THIS EXPERIMENT (E4) WAS DESIGNED TO INVESTIGATE THE MAGNETIC COMPONENT OF ELECTROMAGNETIC WAVES IN THE SOLAR WIND FROM 0.3 TO 1.0 AU. BY MEANS OF ITS WAVEFORM CHANNEL (WFC), THE RAPID VARIATIONS OF THE MAGNETIC FIELD WERE MEASURED UP FROM PLUS OR MINUS 8.75 NT TO PLUS OR MINUS 275 NT IN THREE ORTHOGONAL DIRECTIONS FROM 4 TO 128 HZ. A SPECTRUM ANALYZER OBSERVED THE FIELD COMPONENTS IN THE ECLIPTIC PLANE AND PERPENDICULAR TO IT, TO OBTAIN THE POWER SPECTRAL DENSITY AND PEAK VALUES FOR EIGHT LOGARITHMICALLY SPACED CHANNELS IN THE RANGE FROM 4.7 TO 2200 HZ. BECAUSE OF THE LARGE AMOUNT OF DATA PRODUCED BY THIS EXPERIMENT, AN ADAPTIVE DATA REDUCTION WAS APPLIED. FOR INTERESTING TIME INTERVALS SELECTED BY THE FLUXGATE MAGNETOMETER (NEUBAUER) OR GURNETT (-04), WAVEFORM DATA COULD BE READ INTO AN ON-BOARD MEMORY AT A RAPID RATE TO BE TRANSMITTED SLOWLY AFTERWARDS. FOR MORE DETAILED INFORMATION SEE P 241 IN 'RAUMFAHRTFORSCHUNG', 19, 5, 1975.

----- HELIOS-B, ROSENBAUER-----

INVESTIGATION NAME- PLASMA DETECTORS

NSSDC ID- 76-003A-09

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - H.R. ROSENBAUER
OI - H. PELLKOFER
OI - J.H. WOLFE

MPI-AERONOMY
MPI-EXTRATERR PHYS
NASA-ARC

BRIEF DESCRIPTION

THIS EXPERIMENT (E1) EMPLOYED THREE PLASMA ANALYZERS FOR POSITIVE IONS AND ONE FOR ELECTRONS. ALL DETECTORS WERE MOUNTED NORMAL TO THE SPIN AXIS. POSITIVE IONS WITH ENERGY PER CHARGE WITHIN THE RANGE 0.155 TO 15.32 KEV/Q WERE MEASURED IN TWO ANGULAR DIMENSIONS USING A COMBINATION OF A HEMISPHERICAL, A QUADRISPHERICAL, AND A SINUSOIDALLY SHAPED ELECTROSTATIC ANALYZER. ELECTRONS WITH ENERGY FROM 0.5 TO 1660 EV WERE MEASURED WITH A HEMISPHERICAL ELECTROSTATIC ANALYZER IN ONE DIMENSION. THE EXPERIMENT OPERATED IN SEVERAL MODES WITH DIFFERING TIME RESOLUTION DEPENDING IN DETAIL ON TELEMETRY

FORMAT AND SATELLITE BIT RATE. TYPICAL TIME RESOLUTION WAS ON THE ORDER OF A MINUTE. ALSO, WHENEVER THE SPECIAL SHOCK ALARM MODE WAS TRIGGERED BY EXPERIMENTS -04 OR -01, HIGH TIME RESOLUTION PLASMA DATA WAS RECORDED INTO SPACECRAFT MEMORY FOR LATER TRANSMISSION. BECAUSE THE SPACECRAFT BODY WAS COATED WITH A CONDUCTIVE COATING, THE SHEATH POTENTIALS WERE ABOUT 5 EV, CAUSING FAR LESS DEGRADATION IN THE USEFULNESS OF DATA TAKEN IN THE LOWER ELECTRON ENERGY CHANNELS THAN ON THE HELIOS-A SPACECRAFT, AND ALMOST NO EFFECT ON THE ION DATA. FOR MORE DETAILED INFORMATION SEE P 226 OF "RAUMFAHRTFORSCHUNG," 19, 5, 1975. WHEN AN EVENT WAS DETECTED BY EXPERIMENT -04, A SHOCK ALARM MODE OF OPERATION WAS ENTERED IN WHICH FAST TIME RESOLUTION DATA WERE RECORDED INTO ONBOARD STORAGE MEMORY FOR A PERIOD BEFORE AND AFTER THE EVENT.

----- HELIOS-B, TRAINOR-----

INVESTIGATION NAME- GALACTIC AND SOLAR COSMIC RAYS

NSSDC ID- 76-003A-08

INVESTIGATIVE PROGRAM
CODE SL/CO-0P

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - J.H. TRAINOR	NASA-GSFC
OI - E.C. ROELOF	APPLIED PHYSICS LAB
OI - B.J. TEEGARDEN	NASA-GSFC
OI - F.B. McDONALD	NASA-GSFC
OI - K.G. MCCracken	CSIRO

BRIEF DESCRIPTION

THE DETECTOR COMPLEMENT OF THIS EXPERIMENT (E7) CONSISTED OF THREE SEPARATE DELTA E/DELTA X VS E TELESCOPES AND A PROPORTIONAL COUNTER FOR MONITORING SOLAR X RAYS IN THE RANGE 2-8 KEV. THE HIGH ENERGY TELESCOPE HAD A GEOMETRIC FACTOR OF 0.22 SQ CM-SR AND MEASURED ELECTRONS IN THREE RANGES BETWEEN 2 AND 8 MEV, AND PROTONS AND ALPHA PARTICLES IN THREE RANGES BETWEEN 20 AND 56 MEV/N. PROTONS ABOVE 230 MEV ARE ALSO MEASURED. THE FIRST LOW-ENERGY TELESCOPE (GEOMETRIC FACTOR WAS 0.155 SQ CM-SR) MEASURED PROTONS AND Z > 1 PARTICLES IN THREE RANGES BETWEEN 3 AND 21 MEV/N. THE SECOND LOW-ENERGY TELESCOPE (GEOMETRIC FACTOR WAS 0.015 SQ CM-SR) MEASURES PROTONS IN SEVERAL RANGES BETWEEN 0.12 AND 2.1 MEV, ALPHA PARTICLES IN THE RANGES 0.6-2.1 AND 6-21.2 MEV/N, AND ELECTRONS IN FOUR RANGES BETWEEN 0.12 AND 2 MEV. FOR A NUMBER OF COINCIDENCE MODES, COUNTING DATA SECTORED INTO EIGHT 45 DEG SECTORS WERE OBTAINED. THE DATA CYCLE TIME WAS DEPENDENT ON THE SPACECRAFT TELEMETRY RATE (VARIABLE BETWEEN 4096 AND 8 BITS/S) AND FORMAT. UNDER OPTIMUM CONDITIONS, FIVE EVENTS PER SECOND ARE PULSE HEIGHT ANALYZED AND THE RATE DATA CYCLE IS OF THE ORDER OF 5 MINUTES. AT THE SLOWEST COMBINATION OF BIT RATE AND FORMAT, A COMPLETE DATA CYCLE REQUIRES ABOUT 2.5 HOURS. SEE "IEEE TRANS. ON NUC. SCI.," NS-22, 570, 1975, AND PP 258-260 OF 'RAUMFAHRTFORSCH' FOR FURTHER DETAILS.

***** IMP-H*****

SPACECRAFT COMMON NAME- IMP-H

ALTERNATE NAMES- PL-713A, EXPLORER 47
IMP 7, 06197

NSSDC ID- 72-073A

LAUNCH DATE- 09/23/72 WEIGHT- 390. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC	EPOCH DATE- 09/25/72
ORBIT PERIOD- 17702. MIN	INCLINATION- 17.2 DEG
PERIAPSIS- 201599. KM ALT	APOAPSIS- 235639. KM ALT

PERSONNEL

MG - J.R. HOLTZ	NASA HEADQUARTERS
SC - E.R. SCHMERLING	NASA HEADQUARTERS
PM - M.A. DAVIS	NASA-GSFC
PS - J.H. KING	NASA-GSFC

BRIEF DESCRIPTION

IMP-H CONTINUED THE STUDY BEGUN BY EARLIER IMP SPACECRAFT OF THE INTERPLANETARY AND MAGNETOTAIL REGIONS FROM A NEARLY CIRCULAR ORBIT, NEAR 37 EARTH RADII. THIS 16-SIDED DRUM-SHAPED SPACECRAFT WAS 157 CM HIGH AND 135 CM IN DIAM. IT WAS DESIGNED TO MEASURE ENERGETIC PARTICLES, PLASMA, AND ELECTRIC AND MAGNETIC FIELDS. THE SPIN AXIS WAS NORMAL TO THE ECLIPTIC PLANE, AND THE SPIN PERIOD WAS 1.3 S. THE SPACECRAFT WAS POWERED BY SOLAR CELLS AND A CHEMICAL BATTERY. SCIENTIFIC DATA WERE TELEMETERED AT 1600 BPS (WITH A SECONDARY 400-BPS RATE AVAILABLE).

----- IMP-H, BAME-----

INVESTIGATION NAME- SOLAR PLASMA-ELECTROSTATIC ANALYZER

NSSDC ID- 72-073A-10

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - S.J. BAME	LOS ALAMOS SCI LAB
OI - J.R. ASBRIDGE	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

A HEMISPHERICAL ELECTROSTATIC ANALYZER WAS USED TO STUDY THE DIRECTIONAL INTENSITY OF POSITIVE IONS AND ELECTRONS IN THE SOLAR WIND, MAGNETOSHEATH, AND MAGNETOTAIL. IONS AS HEAVY AS OXYGEN WERE RESOLVED WHEN THE SOLAR WIND TEMPERATURE WAS LOW. ENERGY ANALYSIS WAS ACCOMPLISHED BY CHARGING THE PLATES TO KNOWN VOLTAGE LEVELS AND ALLOWING THEM TO DISCHARGE WITH KNOWN RC TIME CONSTANTS. IN THE SOLAR WIND, POSITIVE IONS FROM 200 EV TO 5 KEV (15 PERCENT SPACING, 3 PERCENT RESOLUTION) AND ELECTRONS FROM 5 EV TO 1 KEV (30 PERCENT SPACING, 15 PERCENT RESOLUTION) WERE STUDIED. IN THE MAGNETOSHEATH, POSITIVE IONS FROM 200 EV TO 5 KEV (15 PERCENT SPACING, 3 PERCENT RESOLUTION) AND FROM 200 EV TO 2 KEV (30 PERCENT SPACING, 15 PERCENT RESOLUTION) AND ELECTRONS FROM 5 EV TO 1 KEV (30 PERCENT SPACING, 15 PERCENT RESOLUTION) WERE STUDIED. IN THE MAGNETOTAIL, POSITIVE IONS FROM 200 EV TO 20 KEV (30 PERCENT SPACING, 15 PERCENT RESOLUTION) AND ELECTRONS FROM 5 EV TO 1 KEV (30 PERCENT SPACING, 15 PERCENT RESOLUTION) AND FROM 100 EV TO 20 KEV (15 PERCENT RESOLUTION) WERE STUDIED.

----- IMP-H, BRIDGE-----

INVESTIGATION NAME- SOLAR PLASMA FARADAY CUP

NSSDC ID- 72-073A-02

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - H.S. BRIDGE	MASS INST OF TECH
OI - A.J. LAZARUS	MASS INST OF TECH
OI - J.H. BINSACK	MASS INST OF TECH
OI - E.F. LYON	MASS INST OF TECH

BRIEF DESCRIPTION

A MODULATED SPLIT-COLLECTOR FARADAY CUP, WHICH WAS PERPENDICULAR TO THE SPACECRAFT SPIN AXIS, WAS USED TO STUDY THE DIRECTIONAL INTENSITY OF POSITIVE IONS AND ELECTRONS IN THE SOLAR WIND, TRANSITION REGION, AND MAGNETOTAIL. ELECTRONS WERE MEASURED IN EIGHT LOGARITHMICALLY EQUISPACED CHANNELS BETWEEN 17 EV AND 7 KEV. POSITIVE IONS WERE MEASURED IN EIGHT CHANNELS BETWEEN 50 EV AND 7 KEV. A SPECTRUM WAS OBTAINED EVERY EIGHT SPACECRAFT REVOLUTIONS. ANGULAR INFORMATION WAS OBTAINED IN EITHER 15 EQUALLY SPACED INTERVALS DURING A 360-DEG REVOLUTION OF THE SATELLITE OR IN 15 ANGULAR SEGMENTS CENTERED MORE CLOSELY ABOUT THE SPACECRAFT SUN LINE.

----- IMP-H, CLINE-----

INVESTIGATION NAME- STUDY OF COSMIC-RAY, SOLAR, AND MAGNETOSPHERIC ELECTRONS

NSSDC ID- 72-073A-13

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
COSMIC RAYS
PARTICLES AND FIELDS

PERSONNEL

PI - I.L. CLINE	NASA-GSFC
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BRIEF DESCRIPTION

THIS EXPERIMENT STUDIED GALACTIC AND SOLAR ELECTRONS AND POSITRONS IN THE KINETIC ENERGY RANGE 50 KEV TO 2 MEV. INFORMATION ON PROTONS BETWEEN 0.5 AND 4.0 MEV WAS ALSO OBTAINED. A COLLIMATED STILBENE CRYSTAL SCINTILLATOR LOOKING PERPENDICULAR TO THE SPACECRAFT SPIN AXIS SERVED AS THE PRINCIPAL DETECTOR. A SIMILAR, FULLY SHIELDED CRYSTAL SERVED TO DETERMINE THE CONTRIBUTION TO THE PRINCIPAL DETECTOR COUNT RATE OF ELECTRONS AND PROTONS GENERATED WITHIN THE PRINCIPAL DETECTOR BY GAMMA RAYS AND NEUTRONS, RESPECTIVELY. A FULLY SHIELDED CSI CRYSTAL SERVED AS A GAMMA-RAY SPECTROMETER AND WAS USED IN COINCIDENCE WITH THE PRINCIPAL DETECTOR TO DISTINGUISH ELECTRONS FROM POSITRONS. COUNT RATES FROM EACH DETECTOR OBTAINED IN EIGHT ANGULAR SECTORS PER REVOLUTION WERE TELEMETERED. IN ADDITION, THE AMPLITUDE AND SHAPE OF THE PULSE GENERATED IN THE PRINCIPAL DETECTOR BY THE FIRST STOPPING PARTICLE IN EACH APPROPRIATE TELEMETRY FRAME WAS STUDIED. PULSE AMPLITUDE AND SHAPE WERE TO YIELD ENERGY (10 PERCENT RESOLUTION) AND PARTICLE SPECIES INFORMATION.

----- IMP-H, FRANK-----

INVESTIGATION NAME- MEASUREMENT OF LOW-ENERGY PROTONS AND ELECTRONS

NSSDC ID- 72-073A-04

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - L.A. FRANK

U OF IOWA

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURED THE ENERGY SPECTRA OF LOW-ENERGY ELECTRONS AND PROTONS IN THE GEOCENTRIC RANGE 30 TO 40 EARTH RADII TO FURTHER UNDERSTAND GEOMAGNETIC STORMS, AURORA, TAIL AND NEUTRAL SHEET, AND OTHER MAGNETOSPHERIC PHENOMENA. THE DETECTOR WAS A DUAL-CHANNEL, CURVED-PLATE, ELECTROSTATIC ANALYZER (LEPEDEA - LOW-ENERGY PROTON AND ELECTRON DIFFERENTIAL ANALYZER) WITH 16 ENERGY INTERVALS BETWEEN 5 EV AND 50 KEV. IT HAD AN ANGULAR FIELD OF VIEW OF 9 DEG BY 25 DEG IN FOUR DIRECTIONS PERPENDICULAR TO THE SPACECRAFT SPIN AXIS. THE DETECTOR WAS OPERATED IN ONE OF TWO MODES: (1) ONE PROVIDING GOOD ANGULAR RESOLUTION (16 DIRECTIONS FOR EACH PARTICLE ENERGY BAND) ONCE EACH 272 S, AND (2) ONE PROVIDING GOOD TEMPORAL RESOLUTION IN WHICH THE ENTIRE ENERGY RANGE IN FOUR DIRECTIONS WAS MEASURED EVERY 68 S.

----- IMP-H, GLOECKLER-----

INVESTIGATION NAME- IONS AND ELECTRONS IN THE ENERGY RANGE
0.1 TO 2 MEV

NSSDC ID- 72-073A-03

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - G. GLOECKLER
OI - C.Y. FAN
OI - D.K. HOVESTADT

U OF MARYLAND
U OF ARIZONA
MPI-EXTRATERR PHYS

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO DETERMINE THE COMPOSITION AND ENERGY SPECTRA OF LOW-ENERGY PARTICLES ASSOCIATED WITH SOLAR ACTIVITY AND INTERPLANETARY PROCESSES. THE DETECTORS USED WERE (1) AN ELECTROSTATIC ANALYZER (TO SELECT PARTICLES OF THE DESIGNATED ENERGY PER CHARGE) COMBINED WITH AN ARRAY OF WINDOWLESS SOLID-STATE DETECTORS (TO MEASURE THE ENERGY LOSS) AND SURROUNDED BY AN ANTICOINCIDENCE SHIELDING, AND (2) A PARTICLE TELESCOPE CONSISTING OF A SILICON SURFACE BARRIER DETECTOR AND A FLAT TWO-CHAMBER PROPORTIONAL COUNTER ENCLOSED IN AN ANTICOINCIDENCE SCINTILLATOR CUP. THE EXPERIMENT MEASURED PARTICLE ENERGIES FROM 0.1- TO 2-MEV PER CHARGE IN 12 BANDS AND UNIQUELY IDENTIFIED POSITRONS AND ELECTRONS AS WELL AS NUCLEI WITH CHARGES OF 2 FROM 1 TO 8 (CHARGE GROUP RESOLUTION FOR Z BETWEEN 9 AND 28). TWO 1000-CHANNEL PULSE HEIGHT ANALYZERS, ONE FOR EACH ELEMENT OF THE TELESCOPE, WERE INCLUDED IN THE EXPERIMENT PAYLOAD. THE TELESCOPE FAILED ON NOVEMBER 25, 1972, WHEN THE WINDOW ON THE PROPORTIONAL COUNTER WEAKENED AND BURST DUE TO EXPOSURE TO UV RADIATION.

----- IMP-H, KRIMIGIS-----

INVESTIGATION NAME- CHARGED PARTICLE MEASUREMENTS EXPERIMENT

NSSDC ID- 72-073A-08

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - S.M. KRIMIGIS
OI - T.P. ARMSTRONG
OI - J.A. VAN ALLEN

APPLIED PHYSICS LAB
U OF KANSAS
U OF IOWA

BRIEF DESCRIPTION

THREE SOLID-STATE DETECTORS IN AN ANTICOINCIDENCE PLASTIC SCINTILLATOR OBSERVED ELECTRONS BETWEEN 0.2 AND 2.5 MEV, PROTONS BETWEEN 0.3 AND 500 MEV, ALPHA PARTICLES BETWEEN 2.0 AND 200 MEV, HEAVY PARTICLES WITH ATOMIC NUMBERS RANGING FROM 2 TO 5 WITH ENERGIES GREATER THAN 8 MEV, HEAVY PARTICLES WITH Z VALUES RANGING BETWEEN 6 AND 8 WITH ENERGIES GREATER THAN 32 MEV, AND INTEGRAL PROTONS AND ALPHAS OF ENERGIES GREATER THAN 50 MEV/NUCLEON, ALL WITH DYNAMIC RANGES OF 1 TO 1 MILLION (PER SQ CM-S-SR). FIVE THIN-WINDOW GEIGER-MUELLER TUBES OBSERVED ELECTRONS OF ENERGY GREATER THAN 15 KEV, PROTONS OF ENERGY GREATER THAN 250 KEV, AND X-RAYS WITH WAVELENGTHS BETWEEN 2 AND 10 A, ALL WITH A DYNAMIC RANGE OF 10 TO 100 MILLION (PER SQ CM-S-SR). PARTICLES AND X-RAYS PRIMARILY OF SOLAR ORIGIN WERE STUDIED, BUT THE DYNAMIC RANGE AND RESOLUTION OF THE INSTRUMENT PERMITTED COSMIC RAYS AND MAGNETOTAIL PARTICLES TO BE OBSERVED.

----- IMP-H, McDONALD-----

INVESTIGATION NAME- SOLAR AND COSMIC-RAY PARTICLES

NSSDC ID- 72-073A-09

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - F.B. McDONALD
OI - D.C. HAGGE
OI - B.J. TEEGARDEN

NASA-GSFC
UNKNOWN
NASA-GSFC

BRIEF DESCRIPTION

THE GSFC COSMIC-RAY EXPERIMENT MEASURED ENERGY SPECTRA, COMPOSITION, AND ANGULAR DISTRIBUTION OF SOLAR AND GALACTIC ELECTRONS, PROTONS, AND HEAVIER NUCLEI UP TO $Z = 30$. THREE DISTINCT DETECTOR SYSTEMS WERE USED. THE FIRST SYSTEM CONSISTED OF A PAIR OF SOLID-STATE TELESCOPES THAT MEASURED INTEGRAL FLUXES ABOVE 150, 350, AND 700 KEV AND OF PROTONS ABOVE 0.05, 0.15, 0.70, 1.0, 1.2, 2.0, 2.5, 5.0, 15, AND 25 MEV. EXCEPT FOR THE .05-MEV PROTON MODE, ALL COUNTING MODES HAD UNIQUE SPECIES IDENTIFICATION. THE SECOND DETECTOR SYSTEM WAS A SOLID-STATE DE/DX VS E TELESCOPE THAT LOOKED PERPENDICULAR TO THE SPIN AXIS. THIS TELESCOPE MEASURED NUCLEI FROM 1 TO 16 U WITH ENERGIES BETWEEN 4 AND 20 MEV/NUCLEON. COUNTS OF PARTICLES IN THE 0.5- TO 4-MEV/NUCLEON RANGE, WITH NO CHARGE RESOLUTION, WERE OBTAINED AS COUNTS IN THE DE/DX, BUT NOT IN THE E SENSOR. THE THIRD DETECTOR SYSTEM WAS A THREE-ELEMENT CSI SCINTILLATOR TELESCOPE WHOSE AXIS MADE AN ANGLE OF 39 DEG WITH RESPECT TO THE SPIN AXIS. THE INSTRUMENT RESPONDED TO ELECTRONS BETWEEN 2 AND 12 MEV AND NUCLEI FROM 1 TO 30 U IN THE ENERGY RANGE 20 TO 500 MEV/NUCLEON. FOR PARTICLES BELOW 80 MEV, THIS INSTRUMENT ACTED AS A DE/DX DETECTOR. ABOVE 80 MEV, IT ACTED AS A BIDIRECTIONAL TRIPLE DE/DX DETECTOR. FLUX DIRECTIONALITY INFORMATION WAS OBTAINED BY DIVIDING CERTAIN PORTIONS OF THE DATA FROM EACH DETECTOR SYSTEM INTO EIGHT ANGULAR SECTORS.

----- IMP-H, OGILVIE-----

INVESTIGATION NAME- SOLAR WIND ION COMPOSITION

NSSDC ID- 72-073A-12

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - K.W. OGILVIE

NASA-GSFC

BRIEF DESCRIPTION

AN ELECTROSTATIC ANALYZER AND WEIN-TYPE VELOCITY SELECTOR WERE USED TO GAIN EXPLORATORY DATA ON HEAVY ION COMPOSITION IN THE SOLAR WIND. THE BULK VELOCITIES OF 4 HE⁺⁺, 4 HE⁺, 3 HE⁺⁺, AND 0 (ISOTOPES INDISTINGUISHABLE) IONS IN ALL IONIZATION STATES WERE SEPARATELY STUDIED. DURING 30 SUCCESSIVE SPACECRAFT SPIN PERIODS, IONS OF A GIVEN SPECIES WERE STUDIED IN 30 LOGARITHMICALLY EQUISPACED BULK VELOCITY CHANNELS FROM 200 TO 600 KM/S. A COMPLETE SET OF MEASUREMENTS REQUIRED ABOUT 10 MIN AND CONSISTED OF 30 ONE-STEP SEQUENCES FOR 4 HE⁺⁺ IONS AND FIVE 30-STEP SEQUENCES FOR EACH OF THE THREE OTHER SPECIES.

----- IMP-H, SCARF-----

INVESTIGATION NAME- PLASMA WAVE

NSSDC ID- 72-073A-11

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - F.L. SCARF
OI - G.M. CROOK
OI - I.M. GREEN
OI - R.W. FREDERICKS

TRW SYSTEMS GROUP
GAINES M. CROOK ASSOC
TRW SYSTEMS GROUP
TRW SYSTEMS GROUP

BRIEF DESCRIPTION

ELECTRIC FIELD COMPONENTS PERPENDICULAR TO THE SPACECRAFT SPIN AXIS, AND THE MAGNETIC FIELD COMPONENT PARALLEL TO THAT AXIS WERE MEASURED BY AN ELECTRIC DIPOLE ANTENNA AND A SEARCH COIL MAGNETOMETER. BOTH SENSORS WERE MOUNTED ON A 3.05-M BOOM. DATA WERE OBTAINED IN EIGHT FREQUENCY CHANNELS FROM 10 HZ TO 100 KHZ IN EITHER THE NORMAL MODE OR THE SNAPSHOT MODE. TWO CHANNELS, CENTERED AT 67 AND 600 HZ, HAD 10-DB FALL-OFF POINTS OF 17 AND 150 HZ, AND 270 AND 810 HZ, RESPECTIVELY. THE REMAINING SIX CHANNELS WERE NARROW-BANDWIDTH CHANNELS CENTERED AT 1.3, 2.3, 5.4, 10.5, 30, AND 70 KHZ. IN THE NORMAL MODE, THE ANTENNA WAS FIRST SAMPLED IN A GIVEN FREQUENCY CHANNEL MANY TIMES DURING A GIVEN MEASUREMENT PERIOD (COMPARABLE TO THE SPACECRAFT SPIN PERIOD). DURING THE NEXT PERIOD, THE SEARCH COIL WAS SAMPLED MANY TIMES IN THE SAME FREQUENCY CHANNEL. NEXT, THE ANTENNA WAS SAMPLED IN THE NEXT FREQUENCY CHANNEL, FOLLOWED BY THE SEARCH COIL IN THAT CHANNEL. THE FREQUENCY CHANNELS WERE INCREMENTED, AND THE SAMPLED SENSORS WERE ALTERNATED UNTIL A FULL SET OF DATA WAS OBTAINED IN 16 MEASUREMENT PERIODS (APPROXIMATELY 20 S). IN THE SNAPSHOT MODE,

ONLY ELECTRIC FIELD DATA WERE TRANSMITTED, AS FOLLOWS. THE ANTENNA WAS FIRST SAMPLED IN A GIVEN FREQUENCY CHANNEL MANY TIMES DURING A GIVEN MEASUREMENT PERIOD. IN THE NEXT PERIOD, THE ANTENNA WAS SAMPLED IN TWO SEQUENCES OF EIGHT FREQUENCY CHANNELS. THIS TWO-PERIOD MEASUREMENT WAS EXECUTED EIGHT TIMES, EACH TIME INCREMENTING THE FREQUENCY CHANNEL STUDIED IN EVERY OTHER PERIOD BY ONE. THUS, A FULL SET OF DATA AGAIN REQUIRED 16 MEASUREMENT PERIODS. IN ADDITION, AN ANALOG MODE, SAMPLING THE ANTENNA AND SEARCH COIL FROM 10 TO 100 HZ, WAS USED IN CONJUNCTION WITH THE SPECIAL PURPOSE ANALOG TELEMETRY TEST THAT WAS TO BE CONDUCTED. UNFORTUNATELY THIS TELEMETRY SYSTEM DID NOT WORK WELL, AND NO USABLE DATA WERE OBTAINED IN THIS MODE OF OPERATION. FOR THE DIGITAL MODES, SOME INTERFERENCE WAS EXPERIENCED FROM THE ASYMMETRIC PLASMA SHEATH ASSOCIATED WITH THE SOLAR CELL ARRAYS. THIS INTERFERENCE LIMITED THE SENSITIVITY OF THE MAGNETIC FIELD MEASUREMENTS AND INTRODUCED COMPLEXITY INTO ANALYSIS OF THE ELECTRIC FIELD MEASUREMENTS.

----- IMP-H, SIMPSON-----

INVESTIGATION NAME- SOLAR FLARE HIGH-Z/LOW-E AND LOW-Z ISOTOPE

NSSDC ID- 72-073A-07

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - J.A. SIMPSON U OF CHICAGO
OI - M. GARCIA-MUNOZ U OF CHICAGO

BRIEF DESCRIPTION

THIS EXPERIMENT USED TWO TELESCOPES TO MEASURE THE COMPOSITION AND ENERGY SPECTRA OF SOLAR (AND GALACTIC) PARTICLES ABOVE ABOUT 0.5 MEV/NUCLEON. THE MAIN TELESCOPE CONSISTED OF FIVE COLINEAR ELEMENTS (THREE SOLID STATE, ONE CSI, AND ONE SAPPHIRE CERENKOV) SURROUNDED BY A PLASTIC ANTICOINCIDENCE SHIELD. THE TELESCOPE HAD A 60-DEG, FULL-ANGLE ACCEPTANCE CONE WITH ITS AXIS APPROXIMATELY NORMAL TO THE SPACECRAFT SPIN AXIS PERMITTING 8-SECTORED INFORMATION ON PARTICLE ARRIVAL DIRECTION. FOUR ELEMENTS OF THE MAIN TELESCOPE WERE PULSE-HEIGHT ANALYZED, AND LOW- AND HIGH-GAIN MODES COULD BE SELECTED BY COMMAND TO PERMIT RESOLUTION OF THE ELEMENTS H THROUGH NI OR OF THE ELECTRONS AND THE ISOTOPE OF H AND HE AND LIGHT NUCLEI. A SELECTION-PRIORITY SCHEME WAS INCLUDED TO PERMIT SAMPLING OF LESS ABUNDANT PARTICLE SPECIES UNDER NORMAL AND SOLAR-FLARE CONDITIONS. THE LOW-ENERGY TELESCOPE WAS ESSENTIALLY A TWO-ELEMENT, SHIELDED, SOLID-STATE DETECTOR WITH A 70-DEG, FULL-ANGLE ACCEPTANCE CONE. THE FIRST ELEMENT WAS PULSE-HEIGHT ANALYZED, AND DATA WERE RECORDED BY SECTORS.

----- IMP-H, STONE-----

INVESTIGATION NAME- ELECTRONS AND HYDROGEN AND HELIUM ISOTOPES

NSSDC ID- 72-073A-06

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - E.C. STONE CALIF INST OF TECH
OI - R.E. VOGT CALIF INST OF TECH

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO MEASURE SOLAR AND GALACTIC ELECTRONS, POSITRONS, AND NUCLEI, AND TO SEPARATE ISOTOPES THROUGH OXYGEN. THE ENERGY RANGES COVERED WERE 0.16 TO 5 MEV (ELECTRONS), 0.16 TO 2 MEV (POSITRONS), AND ABOUT 1 TO 40 MEV/N (NUCLEI). THE INSTRUMENT WAS A TELESCOPE CONSISTING OF 11 COLINEAR, FULLY DEPLETED, SILICON SURFACE BARRIER DETECTORS INSIDE A PLASTIC SCINTILLATOR ANTICOINCIDENCE SHIELD. FOUR OF THE TOP FIVE SENSORS WERE ANNULAR WHILE THE REMAINDER WERE SOLID DISKS. THIS ARRANGEMENT GAVE NARROW GEOMETRY (ANTICOINCIDENCE IN ANNULAR SENSORS) AND WIDE GEOMETRY MODES WITH HALF-ANGLE ACCEPTANCE CONES OF ABOUT 24 AND 36 DEG. THE TELESCOPE AXIS WAS PERPENDICULAR TO THE SPACECRAFT SPIN AXIS. DATA RETURNED CONSISTED OF 8-SECTORED AND SPIN-INTEGRATED COUNT RATES FOR 8 DIFFERENT COINCIDENCE/ ANTICOINCIDENCE MODES AND 2 PARAMETER PULSE HEIGHT ANALYSES FOR 32 PARTICLES EVERY 20.48 S. THE COINCIDENCE MODE CHOSEN FOR PULSE HEIGHT ANALYSIS IN ANY 0.64 S INTERVAL WAS FIXED BY A FIVE-LEVEL PRIORITY SYSTEM. THE PRINCIPAL CONTRIBUTORS TO EACH COINCIDENCE MODE RATE WERE -- (1) 0.16- TO 5-MEV ELECTRONS AND 1- TO 43-MEV/N NUCLEI, (2) 1- TO 5-MEV ELECTRONS AND 13- TO 43-MEV/N NUCLEI, (3) NEUTRALS, SUCH AS GAMMA RAYS, (4) 0.2- TO 1-MEV ELECTRONS, (5) 1- TO 3-MEV ELECTRONS, (6) 1.2- TO 2.4-MEV/N NUCLEI, (7) 4- TO 13-MEV/N NUCLEI, AND (8) ELECTRONS ABOVE 3 MEV AND NUCLEI ABOVE 30 MEV/N.

----- IMP-H, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC ELECTRONS AND PROTONS

NSSDC ID- 72-073A-05

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS NOAA-ERL
OI - C.O. BOSTROM APPLIED PHYSICS LAB
OI - J.H. TRAINOR NASA-GSFC

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION WERE (1) TO STUDY THE PROPAGATION CHARACTERISTICS OF SOLAR COSMIC RAYS THROUGH THE INTERPLANETARY MEDIUM OVER THE ENERGY RANGES INDICATED BELOW, (2) TO STUDY ELECTRON AND PROTON FLUXES THROUGHOUT THE GEOMAGNETIC TAIL AND NEAR THE FLANKS OF THE MAGNETOSPHERE, AND (3) TO STUDY THE ENTRY OF SOLAR COSMIC RAYS INTO THE MAGNETOSPHERE. THE INSTRUMENTATION CONSISTED OF A THREE-ELEMENT TELESCOPE EMPLOYING FULLY DEPLETED, SURFACE BARRIER, SOLID-STATE DETECTORS AND A MAGNET TO DEFLECT ELECTRONS. TWO SIDEMOUNTED DETECTORS WERE USED TO MEASURE THE DEFLECTED ELECTRONS. TWO ADDITIONAL DETECTORS IN SEPARATE MOUNTS WERE USED TO MEASURE CHARGED PARTICLES ABOVE 15 KEV (F) AND Z GREATER THAN OR EQUAL TO 2 ABOVE 0.6 (G1) AND 1.0 MEV (G2) AND Z GREATER THAN OR EQUAL TO 3 ABOVE 2.0 MEV (G3). THE TELESCOPE MEASURED PROTONS IN THREE RANGES BETWEEN 2.1 AND 25 MEV (L4, L5, L6), Z GREATER THAN OR EQUAL TO 1 IN THREE RANGES BETWEEN 0.05 AND 2.1 MEV (L1, L2, L3), ALPHA PARTICLES BETWEEN 8.4 AND 35.0 MEV IN TWO RANGES L11, L12, Z GREATER THAN OR EQUAL TO 2 BETWEEN 2.2 AND 8.4 MEV (L10), AND A BACKGROUND CHANNEL (L9). DEFLECTED ELECTRONS WERE MEASURED IN TWO RANGES BETWEEN 30 AND 200 KEV (L7, L8). A COMPLETE DESCRIPTION OF THE INSTRUMENT IS GIVEN BY D. J. WILLIAMS IN NOAA TECHNICAL REPORT ERL 393-SEL 40, OCT. 1977.

***** IMP-J*****

SPACECRAFT COMMON NAME- IMP-J

ALTERNATE NAMES- PL-723A, IMP 8
EXPLORER 50, 6893

NSSDC ID- 73-078A

LAUNCH DATE- 10/26/73 WEIGHT- 371. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC EPOCH DATE- 10/29/73
ORBIT PERIOD- 17286. MIN INCLINATION- 28.7 DEG
PERIAPSIS- 141224. KM ALT APCAPSIS- 288940. KM ALT

PERSONNEL

MG - J.R. HOLTZ NASA HEADQUARTERS
SC - E.R. SCHMERLING NASA HEADQUARTERS
PM - M.A. DAVIS NASA-GSFC
PS - J.H. KING NASA-GSFC

BRIEF DESCRIPTION

IMP 8 (EXPLORER 50), THE LAST SATELLITE OF THE IMP SERIES, WAS A DRUM-SHAPED SPACECRAFT, 135.6 CM ACROSS AND 157.4 CM HIGH, INSTRUMENTED FOR INTERPLANETARY AND MAGNETOTAIL STUDIES OF COSMIC RAYS, ENERGETIC SOLAR PARTICLES, PLASMA, AND ELECTRIC AND MAGNETIC FIELDS. ITS INITIAL ORBIT WAS MORE ELLIPTICAL THAN INTENDED, WITH APOGEE AND PERIGEE DISTANCES OF ABOUT 45 AND 25 EARTH RADII. ITS ECCENTRICITY DECREASED AFTER LAUNCH. THE SPACECRAFT SPIN AXIS WAS NORMAL TO THE ECLIPTIC PLANE, AND THE SPIN RATE WAS 23 RPM. THE DATA TELEMETRY RATE WAS 1600 BPS.

----- IMP-J, AGGSON-----

INVESTIGATION NAME- ELECTROSTATIC FIELDS

NSSDC ID- 73-078A-11

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - T.L. AGGSON NASA-GSFC
OI - J.P. HEPPNER NASA-GSFC

BRIEF DESCRIPTION

THE INSTRUMENT WAS DESIGNED TO MEASURE AMBIENT ELECTRIC FIELDS IN THE SOLAR WIND AND THE EARTH'S MAGNETOSHEATH UP TO 1 KHZ IN FREQUENCY. THE SENSOR CONSISTED OF A PAIR OF 70-M WIRE ANTENNAS (140 M, TIP-TO-TIP), WHICH WERE HELD RIGID BY CENTRIFUGAL FORCE DUE TO SATELLITE SPIN (ABOUT 24 RPM). THE WIRES WERE INSULATED FROM THE PLASMA, EXCEPT FOR THEIR SHORT OUTER SECTIONS, TO REMOVE THE ACTIVE PROBE AREA FROM THE SPACECRAFT SHEATH. THE ANTENNA SERVED AS A DOUBLE FLOATING

PROBE, AND MEASUREMENTS WERE OBTAINED EVERY 1/4 SPACECRAFT REVOLUTION (ABOUT 0.75 S). ULF AND VLF MEASUREMENTS WERE OBTAINED USING SEVEN 60 PERCENT BANDWIDTH FILTERS WITH CENTER FREQUENCIES LOGARITHMICALLY SPACED FROM 1 HZ TO 1 KHZ. THESE FREQUENCY CHANNELS HAD AN INTRINSIC SENSITIVITY OF $1.0E-5$ V/M, AND A PEAK RANGE OF $1.0E-2$ V/M. HOWEVER, THE EFFECTIVE LOW-FREQUENCY FILTER THRESHOLD WAS DETERMINED BY INTERFERENCE DUE TO HARMONICS OF THE SPACECRAFT SPINNING WITHIN AN ASYMMETRIC SHEATH. THE OTHER MAJOR LIMITATION WAS ALSO DUE TO SHEATH EFFECT. WHENEVER THE ELECTRON PLASMA DENSITY WAS LESS THAN ABOUT 10 PARTICLES/CC, THE SHEATH OVERLAPPED THE ACTIVE ANTENNA PORTIONS AND PRECLUDED MEANINGFUL MEASUREMENTS OF AMBIENT CONDITIONS.

----- IMP-J, BAME-----

INVESTIGATION NAME- SOLAR PLASMA ELECTROSTATIC ANALYZER

NSSDC ID- 73-078A-10 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS
SPACE PLASMA
SOLAR PHYSICS

PERSONNEL

PI - S.J. BAME LOS ALAMOS SCI LAB
OI - J.R. ASBRIDGE LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

A HEMISPHERICAL ELECTROSTATIC ANALYZER MEASURED THE DIRECTIONAL INTENSITY OF POSITIVE IONS AND ELECTRONS IN THE SOLAR WIND, MAGNETOSHEATH, AND MAGNETOTAIL. IONS AS HEAVY AS OXYGEN WERE RESOLVED WHEN THE SOLAR WIND TEMPERATURE WAS LOW. ENERGY ANALYSIS WAS ACCOMPLISHED BY CHARGING THE PLATES TO KNOWN VOLTAGE LEVELS AND ALLOWING THEM TO DISCHARGE WITH KNOWN RC TIME CONSTANTS. IN THE SOLAR WIND, POSITIVE IONS FROM 200 EV TO 5 KEV (15 PERCENT SPACING, 3 PERCENT RESOLUTION) AND ELECTRONS FROM 5 EV TO 1 KEV (30 PERCENT SPACING, 15 PERCENT RESOLUTION) WERE STUDIED. IN THE MAGNETOSHEATH, POSITIVE IONS FROM 200 EV TO 5 KEV (15 PERCENT SPACING, 3 PERCENT RESOLUTION) AND FROM 200 EV TO 20 KEV (30 PERCENT SPACING, 15 PERCENT RESOLUTION) AND ELECTRONS FROM 5 EV TO 1 KEV (30 PERCENT SPACING, 15 PERCENT RESOLUTION) WERE STUDIED. IN THE MAGNETOTAIL, POSITIVE IONS FROM 200 EV TO 20 KEV (30 PERCENT SPACING, 15 PERCENT RESOLUTION) AND ELECTRONS FROM 5 EV TO 1 KEV (30 PERCENT SPACING, 15 PERCENT RESOLUTION) AND FROM 100 EV TO 20 KEV (15 PERCENT RESOLUTION) WERE STUDIED.

----- IMP-J, BRIDGE-----

INVESTIGATION NAME- SOLAR PLASMA FARADAY CUP

NSSDC ID- 73-078A-02 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - H.S. BRIDGE MASS INST OF TECH
OI - A.J. LAZARUS MASS INST OF TECH
OI - J.H. BINSACK MASS INST OF TECH
OI - E.F. LYON MASS INST OF TECH

BRIEF DESCRIPTION

A MODULATED SPLIT-COLLECTOR FARADAY CUP, PERPENDICULAR TO THE SPACECRAFT SPIN AXIS, WAS USED TO STUDY THE DIRECTIONAL INTENSITY OF POSITIVE IONS AND ELECTRONS IN THE SOLAR WIND, TRANSITION REGION, AND MAGNETOTAIL. ELECTRONS WERE STUDIED IN EIGHT LOGARITHMICALLY EQUISPACED ENERGY CHANNELS BETWEEN 17 EV AND 7 KEV. POSITIVE IONS WERE STUDIED IN EIGHT CHANNELS BETWEEN 50 EV AND 7 KEV. A SPECTRUM WAS OBTAINED EVERY EIGHT SPACECRAFT REVOLUTIONS. ANGULAR INFORMATION WAS OBTAINED IN EITHER 15 EQUALLY SPACED INTERVALS DURING A 360-DEG REVOLUTION OF THE SATELLITE OR IN 15 ANGULAR SEGMENTS CENTERED MORE CLOSELY ABOUT THE SPACECRAFT SUNLINE.

----- IMP-J, FRANK-----

INVESTIGATION NAME- MEASUREMENT OF LOW-ENERGY PROTONS AND ELECTRONS

NSSDC ID- 73-078A-04 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - L.A. FRANK U OF IOWA

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO MEASURE THE ENERGY SPECTRA OF LOW-ENERGY ELECTRONS AND PROTONS IN THE GEOCENTRIC RANGE 30 TO 40 R(E) TO GIVE FURTHER DATA ON GEOMAGNETIC STORMS, AURORA, TAIL AND NEUTRAL SHEET, AND OTHER MAGNETOSPHERIC PHENOMENA. THE DETECTOR WAS A DUAL-CHANNEL CURVED-PLATE ELECTROSTATIC ANALYZER (LEPEDEA - LOW ENERGY PROTON AND ELECTRON DIFFERENTIAL ENERGY ANALYZER) WITH 16 ENERGY INTERVALS BETWEEN 5 EV AND 50 KEV. IT HAD AN ANGULAR FIELD OF VIEW OF 9 DEG BY 25 DEG. THE DETECTOR COULD BE OPERATED IN ONE OF TWO

MODES -- (1) ONE PROVIDING GOOD ANGULAR RESOLUTION (16 DIRECTIONS FOR EACH PARTICLE ENERGY BAND) ONCE EACH 272 S, AND (2) ONE PROVIDING GOOD TEMPORAL RESOLUTION IN WHICH THE ENTIRE ENERGY RANGE IN FOUR DIRECTIONS WAS MEASURED EVERY 68 S.

----- IMP-J, GLOECKLER-----

INVESTIGATION NAME- SOLID-STATE DETECTORS

NSSDC ID- 73-078A-03 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS

PERSONNEL

PI - G. GLOECKLER U OF MARYLAND
OI - C.Y. FAN U OF ARIZONA
OI - D.K. HOVESTADT MPI-EXTRATERR PHYS

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO DETERMINE THE COMPOSITION AND ENERGY SPECTRA OF LOW-ENERGY PARTICLES OBSERVED DURING SOLAR FLARES AND 27-DAY RECURRENT EVENTS. THE DETECTORS USED INCLUDE (1) AN ELECTROSTATIC ANALYZER (TO SELECT PARTICLES OF THE DESIRED ENERGY PER CHARGE) COMBINED WITH AN ARRAY OF WINDOWLESS SOLID-STATE DETECTORS (TO MEASURE THE ENERGY LOSS) AND SURROUNDED BY AN ANTICINCIDENCE SHIELDING, AND (2) A THIN WINDOW PROPORTIONAL COUNTER, SOLID-STATE PARTICLE TELESCOPE. THE EXPERIMENT MEASURED PARTICLE ENERGIES FROM 0.1 TO 10 MEV PER CHARGE IN 12 BANDS AND UNIQUELY IDENTIFIED POSITRONS AND ELECTRONS AS WELL AS NUCLEI WITH CHARGES OF Z FROM 1 TO 8 (NO CHARGE RESOLUTION FOR Z GREATER THAN 8). TWO 1000-CHANNEL PULSE HEIGHT ANALYZERS, ONE FOR EACH DETECTOR, WERE INCLUDED IN THE EXPERIMENT PAYLOAD.

----- IMP-J, GURNETT-----

INVESTIGATION NAME- ELECTROSTATIC WAVES AND RADIO NOISE

NSSDC ID- 73-078A-12 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - D.A. GURNETT U OF IOWA
OI - T.L. AGGSON NASA-GSFC
OI - G.W. PFEIFFER U OF IOWA

BRIEF DESCRIPTION

A WIDE-BAND RECEIVER WAS USED TO OBSERVE HIGH-RESOLUTION FREQUENCY-TIME SPECTRA, AND A SIX-CHANNEL NARROW-BAND RECEIVER WITH A VARIABLE CENTER FREQUENCY WAS USED TO OBSERVE WAVE CHARACTERISTICS. THE RECEIVERS OPERATED FROM THREE ANTENNA SYSTEMS. THE FIRST SYSTEM CONTAINED A PAIR OF LONG DIPOLE ANTENNAS (ONE, EXTENDABLE TO ABOUT 124 M, NORMAL TO THE SPACECRAFT SPIN AXIS AND THE OTHER ANTENNA, EXTENDABLE TO ABOUT 6.1 M, ALONG THE SPIN AXIS). THE SECOND SYSTEM CONTAINED A BOOM-MOUNTED TRIAD OF ORTHOGONAL LOOP ANTENNAS. THE THIRD SYSTEM CONSISTED OF A BOOM-MOUNTED .51 M (20 IN.) SPIN AXIS DIPOLE. THE MAGNETIC AND ELECTRIC FIELD INTENSITIES AND FREQUENCY SPECTRA, POLARIZATION, AND DIRECTION OF ARRIVAL OF NATURALLY OCCURRING RADIO NOISE IN THE MAGNETOSPHERE WERE OBSERVED. PHENOMENA STUDIED WERE THE TIME-SPACE DISTRIBUTION, ORIGIN, PROPAGATION, DISPERSION, AND OTHER CHARACTERISTICS OF RADIO NOISES OCCURRING ACROSS AND ON EITHER SIDE OF THE MAGNETOSPHERIC BOUNDARY REGION. THE FREQUENCY RANGE FOR ELECTRIC FIELDS WAS 0.3 HZ TO 200 KHZ, AND FOR MAGNETIC FIELDS IT WAS 20 HZ TO 200 KHZ.

----- IMP-J, KRIMIGIS-----

INVESTIGATION NAME- CHARGED PARTICLE MEASUREMENTS
EXPERIMENT

NSSDC ID- 73-078A-08 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS

PERSONNEL

PI - S.M. KRIMIGIS APPLIED PHYSICS LAB
OI - T.P. ARMSTRONG U OF KANSAS
OI - J.A. VAN ALLEN U OF IOWA

BRIEF DESCRIPTION

THREE SOLID-STATE DETECTORS IN AN ANTICINCIDENCE PLASTIC SCINTILLATOR OBSERVED ELECTRONS BETWEEN 0.2 AND 2.5 MEV, PROTONS BETWEEN 0.3 AND 500 MEV, ALPHA PARTICLES BETWEEN 2.0 AND 200 MEV, HEAVY PARTICLES WITH Z VALUES RANGING FROM 2 TO 5 WITH ENERGIES GREATER THAN 8 MEV, HEAVY PARTICLES WITH Z VALUES RANGING BETWEEN 6 AND 8 WITH ENERGIES GREATER THAN 32 MEV, AND INTEGRAL PROTONS AND ALPHAS OF ENERGIES GREATER THAN 50 MEV/NUCLEON, ALL WITH DYNAMIC RANGES OF 1 TO 1 MILLION (PER SQ CM-S-SR). FIVE THIN-WINDOW GEIGER-MUELLER TUBES OBSERVED ELECTRONS OF ENERGY GREATER THAN 15 KEV, PROTONS OF ENERGY GREATER THAN 250 KEV, AND X-RAYS WITH WAVELENGTHS BETWEEN 2 AND 10 A, ALL WITH A DYNAMIC RANGE OF 10 TO 100 MILLION (PER SQ

CM-S-SR). PARTICLES AND X-RAYS PRIMARILY OF SOLAR ORIGIN WERE STUDIED, BUT THE DYNAMIC RANGE AND RESOLUTION OF THE INSTRUMENT PERMITTED OBSERVATION OF COSMIC RAYS AND MAGNETOTAIL PARTICLES OBSERVED.

----- IMP-J, McDONALD-----

INVESTIGATION NAME- SOLAR AND COSMIC-RAY PARTICLES

NSSDC ID- 73-078A-09

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS
COSMIC RAYS

PERSONNEL

PI - F.B. McDONALD
OI - D.E. HAGGE
OI - B.J. TEEGARDEN

NASA-GSFC
UNKNOWN
NASA-GSFC

BRIEF DESCRIPTION

THE GSFC COSMIC-RAY EXPERIMENT WAS DESIGNED TO MEASURE ENERGY SPECTRA, COMPOSITION, AND ANGULAR DISTRIBUTIONS OF SOLAR AND GALACTIC ELECTRONS, PROTONS, AND HEAVIER NUCLEI UP TO $Z = 30$. THREE DISTINCT DETECTOR SYSTEMS WERE USED. THE FIRST SYSTEM CONSISTED OF A PAIR OF SOLID-STATE TELESCOPES THAT MEASURED INTEGRAL FLUXES OF ELECTRONS ABOVE 150, 350, AND 700 KEV AND OF PROTONS ABOVE .05, .15, .50, .70, 1.0, 1.2, 2.0, 2.5, 5.0, 15, AND 25 MEV. EXCEPT FOR THE .05-MEV PROTON MODE, ALL COUNTING MODES HAD UNIQUE SPECIES IDENTIFICATION. THE SECOND DETECTOR SYSTEM WAS A SOLID-STATE DE/DX VS E TELESCOPE THAT LOOKED PERPENDICULAR TO THE SPIN AXIS. THIS TELESCOPE MEASURED $Z = 1$ TO 16 NUCLEI WITH ENERGIES BETWEEN 4 AND 20 MEV/NUCLEON. COUNTS OF PARTICLES IN THE 0.5- TO 4-MEV/NUCLEON RANGE, WITH NO CHARGE RESOLUTION, WERE OBTAINED AS COUNTS IN THE DE/DX BUT NOT IN THE E SENSOR. THE THIRD DETECTOR SYSTEM WAS A THREE-ELEMENT TELESCOPE WHOSE AXIS MADE AN ANGLE OF 39 DEG WITH RESPECT TO THE SPIN AXIS. THE MIDDLE ELEMENT WAS A CSI SCINTILLATOR, WHILE THE OTHER TWO ELEMENTS WERE SOLID-STATE SENSORS. THE INSTRUMENT RESPONDED TO ELECTRONS BETWEEN 2 AND 12 MEV AND TO $Z = 1$ TO 30 NUCLEI IN THE ENERGY RANGE 20 TO 500 MEV/NUCLEON. FOR PARTICLES BELOW 80 MEV, THIS INSTRUMENT ACTED AS A DE/DX DETECTOR. ABOVE 80 MEV, IT ACTED AS A BIDIRECTIONAL TRIPLE DE/DX DETECTOR. FLUX DIRECTIONALITY INFORMATION WAS OBTAINED BY DIVIDING CERTAIN PORTIONS OF THE DATA FROM EACH DETECTOR INTO EIGHT ANGULAR SECTORS.

----- IMP-J, NESS-----

INVESTIGATION NAME- MAGNETIC FIELD EXPERIMENT

NSSDC ID- 73-078A-01

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - N.F. NESS
OI - C.S. SCEARCE
OI - J.B. SEEK

NASA-GSFC
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A BOOM-MOUNTED TRIAXIAL FLUXGATE MAGNETOMETER DESIGNED TO STUDY THE INTERPLANETARY AND GEOMAGNETIC TAIL MAGNETIC FIELDS. EACH SENSOR HAD THREE DYNAMIC RANGES, PLUS OR MINUS 12, PLUS OR MINUS 36, AND PLUS OR MINUS 108 NT. WITH THE AID OF A BIT COMPACTION SCHEME (DELTA MODULATION), THERE WERE 25 VECTOR MEASUREMENTS MADE AND TELEMETERED PER SECOND. THE EXPERIMENT OPERATED NORMALLY FROM LAUNCH UNTIL MID-1975. ON JULY 11, 1975, BECAUSE OF A RANGE INDICATOR PROBLEM, THE EXPERIMENT OPERATION WAS FROZEN INTO THE 36-NT RANGE. THE DIGITIZATION ACCURACY IN THIS RANGE IS ABOUT PLUS OR MINUS 0.3 NT. ON 23 MARCH, 1978, THE SENSOR FLIPPER FAILED. SINCE THEN, ALTERNATIVE METHODS OF Z-AXIS SENSOR ZERO-LEVEL DETERMINATION WERE REQUIRED.

----- IMP-J, SIMPSON-----

INVESTIGATION NAME- SOLAR FLARE HIGH-Z/LOW-E AND LOW-Z

NSSDC ID- 73-078A-07

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS
COSMIC RAYS

PERSONNEL

PI - J.A. SIMPSON
OI - M. GARCIA-MUNOZ

U OF CHICAGO
U OF CHICAGO

BRIEF DESCRIPTION

THIS EXPERIMENT USED TWO TELESCOPES TO MEASURE THE COMPOSITION AND ENERGY SPECTRA OF SOLAR (AND GALACTIC) PARTICLES ABOVE ABOUT 0.5 MEV/NUCLEON. THE MAIN TELESCOPE CONSISTED OF FIVE COLINEAR ELEMENTS (THREE SOLID STATE, ONE CSI, AND ONE SAPPHIRE CERENKOV) SURROUNDED BY A PLASTIC ANTICINCIDENCE SHIELD. THE TELESCOPE HAD A 60-DEG, FULL-ANGLE ACCEPTANCE CONE WITH ITS AXIS APPROXIMATELY NORMAL TO THE SPACECRAFT SPIN AXIS, PERMITTING 8-SECTORED INFORMATION ON

PARTICLE ARRIVAL DIRECTION. FOUR ELEMENTS OF THE MAIN TELESCOPE WERE PULSE-HEIGHT ANALYZED, AND LOW- AND HIGH-GAIN MODES COULD BE SELECTED BY COMMAND TO PERMIT RESOLUTION OF THE ELEMENTS H THROUGH NI OR OF THE ELECTRONS AND THE ISOTOPES OF H AND HE AND LIGHT NUCLEI. A SELECTION-PRIORITY SCHEME WAS INCLUDED TO PERMIT SAMPLING OF LESS ABUNDANT PARTICLE SPECIES UNDER NORMAL AND SOLAR-FLARE CONDITIONS. THE LOW-ENERGY TELESCOPE WAS ESSENTIALLY A TWO-ELEMENT, SHIELDED, SOLID-STATE DETECTOR WITH A 70-DEG, FULL-ANGLE ACCEPTANCE CONE. THE FIRST ELEMENT WAS PULSE-HEIGHT ANALYZED, AND DATA WERE RECORDED BY SECTORS.

----- IMP-J, STONE-----

INVESTIGATION NAME- ELECTRONS AND HYDROGEN AND HELIUM ISOTOPES

NSSDC ID- 73-078A-06

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - E.C. STONE
OI - R.E. VOGT

CALIF INST OF TECH
CALIF INST OF TECH

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO MEASURE THE DIFFERENTIAL ENERGY SPECTRA OF THE ISOTOPES OF HYDROGEN THROUGH OXYGEN FROM 2 TO 40 MEV/NUCLEON, AND OF ELECTRONS FROM 0.2 TO 5 MEV. THE INSTRUMENT CONSISTED OF A STACK OF 11 FULLY DEPLETED SILICON SOLID-STATE DETECTORS SURROUNDED BY A PLASTIC SCINTILLATOR ANTICINCIDENCE CUP. THE OUTER TWO SOLID-STATE DETECTORS WERE ANNULAR, PERMITTING MEASUREMENTS IN BOTH NARROW GEOMETRY (TYPICAL GEOMETRICAL FACTOR WAS 0.2 SQ CM-SR) AND WIDE GEOMETRY (TYPICAL GEOMETRIC FACTOR WAS 1.5 SQ CM-SR) COINCIDENCE MODES. ANISOTROPY DATA (45 DEG ANGULAR AND 20 S TEMPORAL RESOLUTION) WERE OBTAINED. FOR FURTHER DETAILS SEE P 931 IN 'ASTROPHYS. J.' 205.

----- IMP-J, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC ELECTRONS AND PROTONS

NSSDC ID- 73-078A-05

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS
OI - C.O. BOSTROM
OI - J.H. TRAINER

NOAA-ERL
APPLIED PHYSICS LAB
NASA-GSFC

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION WERE (1) TO STUDY THE PROPAGATION CHARACTERISTICS OF SOLAR COSMIC RAYS THROUGH THE INTERPLANETARY MEDIUM OVER THE ENERGY RANGES INDICATED BELOW, (2) TO STUDY ELECTRON AND PROTON FLUXES THROUGHOUT THE GEOMAGNETIC TAIL AND NEAR THE FLANKS OF THE MAGNETOSPHERE, AND (3) TO STUDY THE ENTRY OF SOLAR COSMIC RAYS INTO THE MAGNETOSPHERE. THE INSTRUMENTATION CONSISTED OF A THREE-ELEMENT TELESCOPE EMPLOYING FULLY DEPLETED SURFACE BARRIER SOLID-STATE DETECTORS AND A MAGNET TO DEFLECT ELECTRONS. TWO SIDE-MOUNTED DETECTORS WERE USED TO MEASURE THE DEFLECTED ELECTRONS. TWO ADDITIONAL DETECTORS IN SEPARATE MOUNTS WERE USED TO MEASURE CHARGED PARTICLES ABOVE 15 KEV (F) AND Z GREATER THAN OR EQUAL TO 2 ABOVE 0.6 (G1) AND 1.0 MEV (G2) AND Z GREATER THAN OR EQUAL TO 3 ABOVE 2.0 MEV (G3). THE TELESCOPE MEASURED PROTONS IN THREE RANGES BETWEEN 2.1 AND 25 MEV (L4, L5, L6), Z GREATER THAN OR EQUAL TO 1 IN THREE RANGES BETWEEN 0.05 AND 2.1 MEV (L1, L2, L3), ALPHA PARTICLES BETWEEN 8.4 AND 35.0 MEV IN TWO RANGES (L11, L12), Z GREATER THAN OR EQUAL TO 2 BETWEEN 2.2 AND 8.4 MEV (L10), AND A BACKGROUND CHANNEL (L9). DEFLECTED ELECTRONS WERE MEASURED IN TWO RANGES BETWEEN 30 AND 200 KEV (L7, L8). A COMPLETE DESCRIPTION OF THE INSTRUMENT WAS GIVEN BY D. J. WILLIAMS IN NOAA TECHNICAL REPORT ERL 393-SEL 40, OCT. 1977.

***** INTERCOSMOS 18*****

SPACECRAFT COMMON NAME- INTERCOSMOS 18

ALTERNATE NAMES- 11082, MAGIC
MAG-1K

NSSDC ID- 78-099A

LAUNCH DATE- 10/24/78
LAUNCH SITE- UNKNOWN, U.S.S.R.
LAUNCH VEHICLE- UNKNOWN

WEIGHT- KG

SPONSORING COUNTRY/AGENCY
U.S.S.R.

IZMIRAN

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 96.4 MIN
PERIAPSIS- 407. KM ALT
EPOCH DATE- 10/25/78
INCLINATION- 83. DEG
APOAPSIS- 768. KM ALT

PERSONNEL
PM - UNKNOWN
PS - V.V. MIGULIN
IZMIRAN

BRIEF DESCRIPTION
LAUNCHED DURING THE IMS PERIOD, THE SPACECRAFT EXPERIMENT OBJECTIVE WAS TO STUDY THE CHARACTER OF THE IONOSPHERE-MAGNETOSPHERE COUPLING BY CONTINUING EXPERIMENTS SIMILAR TO THOSE ON INTERCOSMOS 10. BOTH REAL-TIME AND STORED DATA MODES WERE USED. THE SATELLITE MEASUREMENTS WERE ACCOMPANIED BY SIMULTANEOUS GROUND-BASED, BALLOON, AND ROCKET OBSERVATIONS. THE PARAMETERS WERE -- GEOMAGNETIC FIELD (3 COMPONENTS), LOW-ENERGY PARTICLE FLUXES AND THEIR ANGULAR DISTRIBUTIONS (ELECTRONS AND POSITIVE IONS, 100 EV TO 50 KEV), VLF WAVES (100 H TO 16 KH) ELECTRIC AND MAGNETIC COMPONENTS, ELECTROSTATIC FIELDS OF MAGNETOSPHERIC-IONOSPHERIC ORIGIN BY A DOUBLE-PROBE TECHNIQUE (3 COMPONENTS), ELECTRON AND ION DENSITIES AND TEMPERATURES USING SEVERAL TECHNIQUES, AND THE ION AND NEUTRAL COMPOSITION OF THE UPPER ATMOSPHERE. EXPERIMENT PERSONNEL AND DESCRIPTIONS OF THE INSTRUMENTS HAVE NOT BEEN PROVIDED.

***** INTERCOSMOS 19*****

SPACECRAFT COMMON NAME- INTERCOSMOS 19
ALTERNATE NAMES- 11285, IONOSONDE-1K
IONO-1K

NSSDC ID- 79-020A

LAUNCH DATE- 02/27/79
LAUNCH SITE- UNKNOWN, U.S.S.R.
LAUNCH VEHICLE- UNKNOWN
WEIGHT- KG

SPONSORING COUNTRY/AGENCY
U.S.S.R. INTERCOS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 99.8 MIN
PERIAPSIS- 502. KM ALT
EPOCH DATE- 02/28/79
INCLINATION- 74. DEG
APOAPSIS- 966. KM ALT

PERSONNEL
PS - V.V. MIGULIN
IZMIRAN

BRIEF DESCRIPTION
DURING THE INTERNATIONAL MAGNETOSPHERE STUDY PERIOD AN INTERCOSMOS SPACECRAFT, IONOSONDE-1K, WAS LAUNCHED INTO A HIGH INCLINATION ELLIPTICAL ORBIT WITH A LOW APOGEE. THE MAIN SCIENTIFIC OBJECTIVES OF IONOSONDE-1K WERE (1) THE STUDY OF ELECTRON DENSITY DISTRIBUTION FROM THE MAIN IONIZATION MAXIMUM OF F REGION UP TO THE SATELLITE ALTITUDE WITH A TOP SIDE SOUNDER, AND THE CORRELATION OF THE TIME AND SPACE VARIATIONS WITH SOLAR ACTIVITY, CORPUSCULAR FLUXES AND OTHER GEOPHYSICAL PHENOMENA, (2) GLOBAL MAPPING OF BASIC IONOSPHERIC PARAMETERS AND CONSTRUCTION OF A TOP-SIDE IONOSPHERE MODEL, (3) THE STUDY OF WAVE PROCESSES IN MAGNETOSPHERIC PLASMA IN THE FREQUENCY RANGE 100 HZ TO 5 MHZ, (4) THE STUDY OF TIME AND SPACE VARIATIONS OF EMISSIONS IN THE 6300-6364 A BANDS AND 3914 A AND 5577 A LINES, (5) THE STUDY OF TIME AND SPACE VARIATIONS OF CHARGED PARTICLES WITH ENERGIES BETWEEN 10 EV AND 50 MEV AND THEIR IONOSPHERIC EFFECT, AND (6) THE STUDY OF TIME AND SPACE VARIATIONS OF LOCAL ELECTRON AND ION DENSITIES AND TEMPERATURES. THE PROGRAM INCLUDED SIMULTANEOUS GROUND-BASED OBSERVATIONS AT IONOSPHERIC AND SOLAR STATIONS OF THE USSR AND SOCIALIST COUNTRIES. EXPERIMENT INFORMATION NOT SUPPLIED.

***** ISEE 1*****

SPACECRAFT COMMON NAME- ISEE 1
ALTERNATE NAMES- IMP-K, 10422
MOTHER, INTNL SUN EARTH EXPL-A
ISEE-A

NSSDC ID- 77-102A

LAUNCH DATE- 10/22/77
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA
WEIGHT- 340.2 KG

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 3446.4 MIN
PERIAPSIS- 281. KM ALT
EPOCH DATE- 10/23/77
INCLINATION- 28.7 DEG
APOAPSIS- 138120. KM ALT

PERSONNEL
MG - M. AUCREMANNE
SC - E.R. SCHMERLING
PM - J.P. CORRIGAN
PS - K.W. OGILVIE
NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE EXPLORER CLASS MOTHER SPACECRAFT WAS PART OF THE MOTHER/DAUGHTER/HELIOCENTRIC MISSION (ISEE A, B, AND C). THE PURPOSES OF THE MISSION WERE--(1) TO INVESTIGATE SOLAR/TERRESTRIAL RELATIONSHIPS AT THE OUTERMOST BOUNDARIES OF THE EARTH'S MAGNETOSPHERE, (2) TO EXAMINE IN DETAIL THE STRUCTURE OF THE SOLAR WIND NEAR THE EARTH AND THE SHOCK WAVE THAT FORMS THE INTERFACE BETWEEN THE SOLAR WIND AND EARTH, (3) TO CONTINUE THE INVESTIGATION OF COSMIC RAYS AND SOLAR FLARES IN THE INTERPLANETARY REGION NEAR 1 AU. THE MISSION THUS EXTENDED THE INVESTIGATIONS OF PREVIOUS IMP SPACECRAFT. THE MOTHER/DAUGHTER PORTION OF THE MISSION CONSISTED OF TWO SPACECRAFT WITH A STATION-KEEPING CAPABILITY IN A HIGHLY ECCENTRIC EARTH ORBIT WITH APOGEE TO 23 EARTH RADII. THE SPACECRAFT MAINTAINED A SMALL SEPARATION DISTANCE, AND MADE SIMULTANEOUS COORDINATED MEASUREMENTS TO PERMIT SEPARATION OF SPATIAL FROM TEMPORAL IRREGULARITIES IN THE NEAR-EARTH SOLAR WIND, THE BOW SHOCK, AND INSIDE THE MAGNETOSPHERE. THE SPIN RATE WAS SET AT 19.75 RPM, DIFFERING SLIGHTLY FROM THE ISEE-B SPACECRAFT. FOR INSTRUMENT DESCRIPTIONS WRITTEN BY THE INVESTIGATORS, SEE IEEE TRANSACTIONS ON GEOSCIENCE ELECTRONICS, VOL. GE-16, NO. 3, JULY, 1978.

----- ISEE 1, ANDERSON-----

INVESTIGATION NAME- ELECTRONS AND PROTONS

NSSDC ID- 77-102A-10

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - K.A. ANDERSON	U OF CALIF, BERKELEY
OI - C.I. MENG	APPLIED PHYSICS LAB
OI - F.V. CORONITI	U OF CALIF, LA
OI - J.M. BOSQUED	CESR
OI - R. PELLAT	CTR FOR THEORETIC PHYS
OI - G.K. PARKS	U OF WASHINGTON
OI - R.P. LIN	U OF CALIF, BERKELEY
OI - H. REME	CESR

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO DETERMINE, BY USING IDENTICAL INSTRUMENTATION ON THE MOTHER/DAUGHTER SPACECRAFT, THE SPATIAL EXTENT, PROPAGATION VELOCITY, AND TEMPORAL BEHAVIOR OF A WIDE VARIETY OF PARTICLE PHENOMENA. ELECTRONS WERE MEASURED AT 2 AND 6 KEV AND IN TWO BANDS: 8 TO 200 KEV AND 30 TO 200 KEV. PROTONS WERE MEASURED AT 2 AND 6 KEV AND IN THREE BANDS: 8 TO 200 KEV, 30 TO 200 KEV, AND 200 TO 380 KEV. THE 30 KEV THRESHOLD COULD BE COMMANDED TO 15 OR 60 KEV. IDENTICAL INSTRUMENTATION ON EACH SPACECRAFT CONSISTED OF A PAIR OF SURFACE BARRIER SEMICONDUCTOR DETECTOR TELESCOPES (ONE WITH A FOIL AND ONE WITHOUT A FOIL) AND FOUR FIXED-ENERGY ELECTRIC FIELD PARTICLE ANALYZERS. THE TELESCOPES HAD A VIEWING CONE WITH HALF ANGLE 40 DEG, ORIENTED AT ABOUT 20 DEG TO THE SPIN AXIS.

----- ISEE 1, BAME-----

INVESTIGATION NAME- FAST PLASMA AND SOLAR WIND IONS

NSSDC ID- 77-102A-01

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS

PERSONNEL

PI - S.J. BAME	LOS ALAMOS SCI LAB
OI - H. MIGGENRIEDER	MPI-EXTRATERR PHYS
OI - K. SCHINDLER	RUHR-U BOCHUM
OI - J.R. ASBRIDGE	LOS ALAMOS SCI LAB
OI - H.R. ROSENBAUER	MPI-AERONOMY
OI - H. VOLK	MPI-NUCLEAR PHYS
OI - M.D. MONTGOMERY	LOS ALAMOS SCI LAB
OI - G. PASCHMANN	MPI-EXTRATERR PHYS
OI - W.C. FELDMAN	LOS ALAMOS SCI LAB
OI - E.W. HONES, JR.	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED, IN CONJUNCTION WITH A SIMILAR INSTRUMENT PROVIDED BY G. PASCHMANN OF MAX PLANCK INSTITUTE FOR FLIGHT ON THE DAUGHTER SPACECRAFT, TO STUDY THE PLASMA VELOCITY DISTRIBUTION AND ITS SPATIAL AND TEMPORAL VARIATIONS IN THE SOLAR WIND, BOW SHOCK, MAGNETOSHEATH, MAGNETOPAUSE, MAGNETOTAIL, AND MAGNETOSPHERE. PROTONS FROM 50 EV TO 40 KEV AND ELECTRONS FROM 5 EV TO 20 KEV WERE MEASURED IN ONE, TWO, AND THREE DIMENSIONS BY THREE 90-DEG SPHERICAL ELECTROSTATIC ANALYZERS. THE EXPERIMENT, WHICH UTILIZED CHANNELTRON ELECTRON MULTIPLIERS AS DETECTORS, OPERATED IN TWO RANGES, WITH ENERGY RESOLUTION FOR SEVERAL STEPS IN EACH RANGE OF 10 PERCENT OF THE CENTER ENERGY LEVEL.

----- ISEE 1, CLINE-----

INVESTIGATION NAME- GAMMA-RAY BURSTS

NSSDC ID- 77-102A-14

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
GAMMA-RAY ASTRONOMY

PERSONNEL

PI - T.L. CLINE	NASA-GSFC
OI - D.K. HOVESTADT	MPI-EXTRATERR PHYS
OI - B.J. TEEGARDEN	NASA-GSFC
OI - G. GLOECKLER	U OF MARYLAND

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO RECOGNIZE AND RECORD THE TIME HISTORY OF GAMMA-RAY BURSTS. TWO SENSORS WERE USED: A 4-CM DIAM. CESIUM IODIDE SCINTILLATOR SYSTEM AND A 6-SQ CM SOLID-STATE (CADMIUM TELLURIDE) ARRAY. AN INTENSITY INCREASE IN EITHER OF THE SENSORS COULD CAUSE A TRIGGER TO OCCUR, FREEZING THE CIRCULATING MEMORY OF THE IMMEDIATE PAST COUNTING RATE HISTORY AND FILLING ANOTHER MEMORY WITH THE COUNTING RATES FOR 1 MIN FOLLOWING THE TRIGGER. THE TIME OF THE TRIGGER AND ITS LOCATION IN THE TEMPORAL HISTORY WERE ALSO STORED IN MEMORY. ALL STORED INFORMATION WAS THEN READ OUT AT A VERY LOW BIT RATE DURING THE SUCCEEDING SEVERAL HOURS. THREE TRIGGERS WERE USED BASED ON TOTAL COUNTS IN 4 MS, 32 MS, AND 256 MS. SIX MEMORIES WERE USED, THREE BEFORE AND THREE AFTER THE TRIGGER, YIELDING STORAGE OF 1/64, 1/8, AND 1 MIN OF DATA EACH TO PROVIDE DETAILED RISE-TIME INFORMATION.

----- ISEE 1, FRANK-----

INVESTIGATION NAME- HOT PLASMA

NSSDC ID- 77-102A-03

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS

PERSONNEL

PI - L.A. FRANK	U OF IOWA
OI - V.M. VASYLIUNAS	MPI-AERONOMY
OI - C.F. KENNEL	U OF CALIF, LA

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO STUDY, BY MEANS OF IDENTICAL INSTRUMENTATION ON THE MOTHER/DAUGHTER SPACECRAFT, THE SPATIAL AND TEMPORAL VARIATIONS OF THE SOLAR WIND AND MAGNETOSHEATH ELECTRONS AND IONS. PROTONS AND ELECTRONS IN THE ENERGY RANGE FROM 1 EV TO 45 KEV WERE MEASURED IN 64 CONTIGUOUS ENERGY BANDS WITH AN ENERGY RESOLUTION ($\Delta E/E$) OF 0.16. A QUADRISPHERICAL LOW-ENERGY PROTON AND ELECTRON DIFFERENTIAL ENERGY ANALYZER (LEPEDEA), EMPLOYING SEVEN CONTINUOUS CHANNEL ELECTRON MULTIPLIERS IN EACH OF ITS TWO CONE (ONE FOR PROTONS AND ONE FOR ELECTRONS) ELECTROSTATIC ANALYZERS WAS FLOWN ON BOTH MOTHER AND DAUGHTER SPACECRAFT. ALL BUT 2 PERCENT OF THE 4 PI-SR SOLID-ANGLE WAS COVERED FOR PARTICLE VELOCITY VECTORS. A GM TUBE WAS ALSO INCLUDED, WITH A CONICAL FIELD OF VIEW OF 40 DEG FULL ANGLE, PERPENDICULAR TO THE SPIN AXIS. THIS DETECTOR WAS SENSITIVE TO ELECTRONS WITH E GREATER THAN OR EQUAL TO 45 KEV, AND PROTONS WITH E GREATER THAN OR EQUAL TO 600 KEV.

----- ISEE 1, GURNETT-----

INVESTIGATION NAME- PLASMA WAVES

NSSDC ID- 77-102A-07

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - D.A. GURNETT	U OF IOWA
OI - F.L. SCARF	TRW SYSTEMS GROUP
OI - R.W. FREDERICKS	TRW SYSTEMS GROUP
OI - E.J. SMITH	NASA-JPL

BRIEF DESCRIPTION

THIS EXPERIMENT, IN CONJUNCTION WITH A SIMILAR (BUT SIMPLER) EXPERIMENT ON ISEE 2, WAS DESIGNED TO MEASURE WAVE PHENOMENA OCCURRING WITHIN THE MAGNETOSPHERE AND SOLAR WIND. THREE ELECTRIC DIPOLE ANTENNAS AND A TRIAXIAL SEARCH COIL ANTENNA WERE USED. THE INSTRUMENTATION CONSISTED OF FOUR MAIN ELEMENTS: (1) A NARROW-BAND SWEEP FREQUENCY RECEIVER WITH 32 FREQUENCY STEPS IN EACH OF FOUR BANDS FROM 100 HZ TO 400 KHZ. A COMPLETE SWEEP REQUIRED 23 S; (2) A HIGH TIME RESOLUTION SPECTRUM ANALYZER WITH 20 CHANNELS FROM 5.62 HZ TO 311 KHZ FOR ELECTRIC FIELD AND 14 IDENTICAL CHANNELS FROM 5.62 HZ TO 10 KHZ FOR MAGNETIC FIELD INFORMATION. THE ELECTRIC AND MAGNETIC CHANNELS WERE SAMPLED SIMULTANEOUSLY; (3) A WAVE NORMAL ANALYZER TO PROVIDE COMPONENTS FOR COMPUTING THE WAVE NORMAL AND THE POYNTING FLUX. THIS ANALYZER HAD A 10 HZ BANDWIDTH, AND COVERED 32 FREQUENCIES FROM 100 HZ TO 5 KHZ; AND (4) A WIDE-BAND RECEIVER TO CONDITION ELECTRIC AND MAGNETIC WAVEFORMS FOR TRANSMISSION TO THE GROUND VIA THE SPECIAL-PURPOSE ANALOG TRANSMITTER. THIS RECEIVER ALSO PROVIDED THE SIGNALS FOR LONG

BASELINE INTERFEROMETER MEASUREMENTS BETWEEN ISEE 1 AND ISEE 2. THERE WERE TWO BASIC FREQUENCY CHANNELS: 10 HZ TO 1 KHZ AND 650 HZ TO 10 OR 40 KHZ. IN ADDITION, THE FREQUENCY RANGE COULD BE SHIFTED BY A FREQUENCY CONVERSION SCHEME TO ANY OF 8 RANGES UP TO 2 MHZ.

----- ISEE 1, HARVEY-----

INVESTIGATION NAME- PLASMA DENSITY

NSSDC ID- 77-102A-08

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - C.C. HARVEY	PARIS OBSERVATORY
OI - M. PETIT	CNET
OI - J.R. MCAFEE	NOAA-ERL
OI - D. JONES	ESA-ESTEC
OI - J.M. ETCHETO	CNET
OI - R.J.L. GRARD	ESA-ESTEC
OI - R.E. GENDRIN	CNET

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURED THE PLASMA ELECTRON DENSITY NEAR THE MOTHER SATELLITE AND ALSO THE TOTAL ELECTRON CONTENT BETWEEN THE MOTHER AND DAUGHTER SPACECRAFT. THE EXPERIMENT CONSISTED OF TWO DISTINCT PARTS -- (1) THE MOTHER SPACECRAFT THAT CARRIED AN EXPERIMENT (THE SOUNDER) TO DETECT RESONANCES OF THE AMBIENT PLASMA. AFTER AN ANTENNA HAD BEEN MOMENTARILY EXCITED AT ONE OF THE CHARACTERISTIC FREQUENCIES OF THE PLASMA IN WHICH IT WAS IMMersed, A PRONOUNCED 'RINGING' WAS OBSERVED. THESE RESONANCES OCCUR AT THE PLASMA FREQUENCY, THE UPPER HYBRID RESONANCE, THE CYCLOTRON FREQUENCY AND ITS HARMONICS, AND THE MEASUREMENT OF THEIR FREQUENCIES PERMITTED THE DETERMINATION OF SEVERAL PLASMA PARAMETERS, INCLUDING THE ELECTRON DENSITY. IN THIS EXPERIMENT, THE TRANSMITTER WAS DESIGNED TO STEP THROUGH 128 SUB-BANDS, COVERING THE CHARACTERISTIC RESONANCE FREQUENCIES OF THE PLASMA, FROM 0.3 TO 50.9 KHZ, AND FROM 0 TO 353 KHZ. (2) THE INTEGRATED DENSITY BETWEEN THE MOTHER AND THE DAUGHTER WAS OBTAINED FROM A SECOND EXPERIMENT (THE PROPAGATION EXPERIMENT) THAT MEASURED THE PHASE DELAY INTRODUCED BY THE AMBIENT PLASMA ONTO A WAVE OF FREQUENCY ABOUT 683 KHZ TRANSMITTED FROM THE MOTHER AND RECEIVED ON THE DAUGHTER (EXPERIMENT 6). THE PHASE WAS COMPARED AGAINST A PHASE-COHERENT SIGNAL TRANSMITTED FROM THE MOTHER TO THE DAUGHTER BY MODULATION ONTO A CARRIER OF FREQUENCY HIGH ENOUGH TO BE UNAFFECTED BY THE AMBIENT PLASMA (272.5 MHZ). DUE TO PERTURBATIONS TO OTHER EXPERIMENTS, ACTIVE OPERATION WAS ON A LIMITED DUTY CYCLE.

----- ISEE 1, HELLIWELL-----

INVESTIGATION NAME- VLF WAVE PROPAGATION

NSSDC ID- 77-102A-13

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS
INTERPLANETARY PHYSICS

PERSONNEL

PI - R.A. HELLIWELL	STANFORD U
OI - T.F. BELL	STANFORD U

BRIEF DESCRIPTION

THIS EXPERIMENT WAS INTENDED TO PROVIDE DATA TO STUDY INTERACTIONS BETWEEN DISCRETE VLF WAVES AND ENERGETIC PARTICLES IN THE MAGNETOSPHERE. THE VLF WAVES WERE PRODUCED BY A GROUND-BASED TRANSMITTER. INJECTION OF THE WAVE BEYOND THE IONOSPHERE WAS ASSURED BY TRANSMITTER LOCATION IN A REGION WHERE THE MAGNETIC LINES OF FORCE ARE OPEN, IN THIS CASE, SIPLE STATION, ANTARCTICA. THE INJECTED SIGNAL AND ANY STIMULATED VLF EMISSIONS WERE RECORDED THROUGH A LOOP ANTENNA BY A 1- TO 32-KHZ BROADBAND RECEIVER ON THE SATELLITE. THE OBSERVED PARAMETERS WERE INTENSITY OF RECEIVED RADIO FREQUENCY AS A FUNCTION OF TIME.

----- ISEE 1, HEPPNER-----

INVESTIGATION NAME- DC ELECTRIC FIELD

NSSDC ID- 77-102A-11

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - J.P. HEPPNER	NASA-GSFC
OI - T.L. AGGSON	NASA-GSFC
OI - N.C. MAYNARD	NASA-GSFC
OI - D.A. GURNETT	U OF IOWA
OI - D.P. CAUFFMAN	LOCKHEED PALO ALTO

BRIEF DESCRIPTION

THIS EXPERIMENT WAS INTENDED TO STUDY QUASI-STATIC ELECTRIC FIELD AND LOW-FREQUENCY PLASMA WAVES IN THE PLASMASPHERE, MAGNETOSPHERE, MAGNETOSHEATH, AND SOLAR WIND. THE DOUBLE-PROBE FLOATING-POTENTIAL TECHNIQUE WAS APPLIED USING LONG-WIRE ANTENNA PROBES WITH AN EFFECTIVE ELECTRIC FIELD BASELINE OF 179 METERS. THE DC DIFFERENTIAL VOLTAGE WAS MEASURED 8 OR 32 TIMES PER SECOND, DEPENDING ON BIT RATE. IN ADDITION, THE DC FIELD WAS MEASURED AT SELECTED AZIMUTHAL ANGLES RELATIVE TO THE SUN AND THE MAGNETIC FIELD, AND THE PEAK VALUE OF ΔV AND ITS AZIMUTHAL ANGLES. LOW-FREQUENCY WAVES WERE MEASURED IN 8 FREQUENCY BANDS AS FOLLOWS - 0.19 TO 0.6, 0.6 TO 1.9, 1.9 TO 6, 6 TO 19, 19 TO 60, 60 TO 190, 190 TO 600, AND 600 TO 1900 HZ. DC MODE MEASUREMENTS HAD A TWO-STEP VARIABLE GAIN AMPLIFIER CONTROLLED FROM THE GROUND. THE RESOLUTION IN THE HIGHEST GAIN STATE WAS 0.0005 MV/M. THE AC MEASUREMENT ELECTRONICS CONSISTED OF TWO AMPLIFIER SECTIONS. ONE AMPLIFIER WAS USED FOR LOW-FREQUENCY CHANNELS, AND ONE FOR HIGH-FREQUENCY CHANNELS. GAIN LINES FOR EACH AMPLIFIER WERE CONTROLLABLE INDEPENDENTLY FROM THE GROUND. IN THE HIGHEST GAIN MODE, EACH ANALYZER CHANNEL HAD A SENSITIVITY OF 0.04 MICROVOLTS/M RMS. THE EXPERIMENT COULD BE RUN IN EITHER A SUN-SENSOR SYNCHRONIZED OR A FREE STATE AS CONTROLLED FROM GROUND. IN ADDITION, THE AC PORTION COULD BE RUN IN AN AVERAGING MODE, OR AN ALTERNATING AVERAGING AND PEAK AMPLITUDE DETECTION MODE KEVED TO THE TELEMETRY READOUT SEQUENCE.

----- ISEE 1, HOVESTADT-----

INVESTIGATION NAME- LOW-ENERGY COSMIC RAYS

NSSDC ID- 77-102A-05

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
COSMIC RAYS
PARTICLES AND FIELDS

PERSONNEL

PI - D.K. HOVESTADT	MPI-EXTRATERR PHYS
OI - J.J. O'GALLAGHER	U OF MARYLAND
OI - M. SCHOLER	MPI-EXTRATERR PHYS
OI - L.A. FISK	U OF NEW HAMPSHIRE
OI - C.Y. FAN	U OF ARIZONA
OI - G. GLOECKLER	U OF MARYLAND

BRIEF DESCRIPTION

THIS INSTRUMENT, CARRIED ON ISEE 1 AND ISEE 3, WAS DESIGNED TO MEASURE SOLAR, INTERPLANETARY, AND MAGNETOSPHERIC ENERGETIC IONS IN NUMEROUS BANDS WITHIN THE ENERGY RANGE 2 KEV/NUCLEON TO 80 MEV/NUCLEON, AND ELECTRONS IN FOUR CONTIGUOUS BANDS FROM 75 TO 1300 KEV. AT THE LOWER ENERGIES, CHARGE STATES OF HEAVY IONS IN THE HIGH SPEED (GREATER THAN 500 KM/S) SOLAR WIND WERE DETERMINED. IN THE RANGE 0.3 TO 80 MEV/NUCLEON, THE ENERGY SPECTRA, ANISOTROPIES, AND COMPOSITION OF ENERGETIC IONS WERE DETERMINED. IN THE LIMITED RANGE 0.4 TO 6 MEV/NUCLEON, SIMULTANEOUS DETERMINATION OF IONIC AND NUCLEAR CHARGE WAS POSSIBLE. THE INSTRUMENT CONSISTED OF THREE DIFFERENT SENSOR SYSTEMS. ULECA (ULTRALOW-ENERGY CHARGE ANALYZER) WAS AN ELECTROSTATIC ANALYZER WITH SOLID STATE DETECTORS. ITS ENERGY RANGE WAS APPROXIMATELY 3 TO 560 KEV/Q. ULEWAT (ULTRALOW-ENERGY WIDE-ANGLE TELESCOPE) WAS A DE/DX - E THIN-WINDOW FLOW THROUGH PROPORTIONAL COUNTER/SOLID STATE DETECTOR TELESCOPE COVERING THE RANGE 0.2 TO 80 MEV/NUCLEON (FE). ULEZEQ (ULTRALOW-ENERGY Z, E, AND Q) WAS A COMBINATION OF AN ELECTROSTATIC ANALYZER AND A DE/DX - E SYSTEM WITH A THIN-WINDOW PROPORTIONAL COUNTER AND A POSITION-SENSITIVE SOLID STATE DETECTOR. THE ENERGY RANGE WAS 0.4 TO 6 MEV/NUCLEON. DATA COULD BE OBTAINED IN 45-DEG SECTORS.

----- ISEE 1, MOZER-----

INVESTIGATION NAME- QUASI-STATIC ELECTRIC FIELDS

NSSDC ID- 77-102A-06

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - F.S. MOZER	U OF CALIF, BERKELEY
OI - H.C. KELLEY	U OF CALIF, BERKELEY

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT WAS TO STUDY THE QUASI-STATIC ELECTRIC FIELD IN THE PLASMASPHERE, MAGNETOSPHERE, MAGNETOSHEATH, AND SOLAR WIND. THE 8-CM-DIAM SPHERES WERE SEPARATED BY 73.5 M AND WERE POSITIONED IN THE SATELLITE SPIN PLANE. TO ATTEMPT TO OVERCOME THE SPACECRAFT SHEATH (A POTENTIAL PROBLEM WHICH PLAGUES ALL ELECTRIC FIELD DETECTORS), AN ELECTRON GUN WAS INCLUDED ON THE SPACECRAFT BODY. THE INSTRUMENT WAS DESIGNED TO BE SENSITIVE TO FIELDS FROM 0.1 TO 200 MV/M IN THE FREQUENCY BAND OF 0 TO 12 HZ. THE EXPERIMENT ALSO MEASURED THE ELECTRIC FIELD COMPONENT OF WAVES AT FREQUENCIES LESS THAN 1000 HZ.

----- ISEE 1, OGILVIE-----

INVESTIGATION NAME- FAST ELECTRONS

NSSDC ID- 77-102A-02

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS

PERSONNEL

PI - K.W. OGILVIE	NASA-GSFC
OI - J.D. SCUDDER	NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT STUDIED THE TRANSPORT COEFFICIENTS OF TURBULENCE IN -- THE COLLISIONLESS PLASMA REPRESENTED BY THE INTERPLANETARY MEDIUM AND MAGNETOSHEATH, LOW-ENERGY SOLAR ELECTRON EVENTS, AND BOW SHOCK ASSOCIATED ELECTRONS. TWO TRIAXIAL SYSTEMS OF 127-DEG CYLINDRICAL ELECTROSTATIC ANALYZERS WERE USED TO MAKE THREE-DIMENSIONAL MEASUREMENTS OF THE ELECTRON DISTRIBUTION FUNCTION. THERE WERE THREE MODES OF OPERATION, WITH THE FOLLOWING NOMINAL ENERGY RANGES: SOLAR WIND, 7 TO 500 EV; MAGNETOSHEATH, 10 EV TO 2 KEV; AND MAGNETOTAIL AND SOLAR, 105 EV TO 7.05 KEV. ENERGY RESOLUTION ($\Delta E/E$) WAS 0.07. THE ENTIRE SET OF SIX SIMULTANEOUS SPECTROMETER MEASUREMENTS WAS TAKEN WHILE THE SATELLITE ROTATED THROUGH 60 DEG. EACH SPECTROMETER CONSISTED OF THE CURVED PLATE ANALYZER AND TWO CHANNELTRON DETECTORS.

----- ISEE 1, RUSSELL-----

INVESTIGATION NAME- FLUXGATE MAGNETOMETER

NSSDC ID- 77-102A-04

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - C.T. RUSSELL	U OF CALIF, LA
OI - R.L. MCPHERRON	U OF CALIF, LA
OI - P.C. HEDGECECK	IMPERIAL COLLEGE
OI - E.W. GREENSTADT	TRW SYSTEMS GROUP
OI - M.G. KIVELSON	U OF CALIF, LA

BRIEF DESCRIPTION

IN THIS TRIAXIAL FLUXGATE MAGNETOMETER, THREE RING CORE SENSORS IN AN ORTHOGONAL TRIAD WERE ENCLOSED IN A FLIPPER MECHANISM AT THE END OF THE MAGNETOMETER BOOM. THE ELECTRONICS UNIT WAS ON THE MAIN BODY OF THE SPACECRAFT AT THE FOOT OF THE BOOM. THE MAGNETOMETER HAD TWO OPERATING RANGES OF PLUS OR MINUS 8192 NT AND PLUS OR MINUS 256 NT IN EACH VECTOR COMPONENT. THE DATA WERE DIGITIZED AND AVERAGED WITHIN THE INSTRUMENT TO PROVIDE INCREASED RESOLUTION AND TO PROVIDE NYQUIST FILTERING. THERE WERE TWO MODES FOR THE TRANSMISSION OF THE AVERAGED DATA. IN THE DOUBLE-PRECISION MODE OF OPERATION, 16-BIT SAMPLES OF DATA WERE TRANSMITTED. THIS PROVIDED A MAXIMUM RESOLUTION OF PLUS OR MINUS 1/4 NT OR 1/128 NT IN THE LOW AND HIGH SENSITIVITY RANGES. IN THE SINGLE-PRECISION MODE, ANY 8 CONSECUTIVE BITS OF THE ABOVE 16 BITS WERE SELECTED BY GROUND COMMAND FOR TRANSMISSION AND THE TELEMETRY BANDWIDTHS OF THE MAGNETOMETER WERE DOUBLED. THIS BANDWIDTH VARIED FROM 2 HZ AT THE LOW TELEMETRY RATE DOUBLE-PRECISION EXPERIMENT MODE TO 32 HZ AT THE HIGH TELEMETRY RATE SINGLE-PRECISION EXPERIMENT MODE.

----- ISEE 1, SHARP-----

INVESTIGATION NAME- ION COMPOSITION

NSSDC ID- 77-102A-12

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - R.D. SHARP	LOCKHEED PALO ALTO
OI - G. HAERENDEL	MPI-EXTRATERR PHYS
OI - H.R. ROSENBAUER	MPI-AERONOMY
OI - R.G. JOHNSON	LOCKHEED PALO ALTO
OI - E.G. SHELLEY	LOCKHEED PALO ALTO
OI - J. GEISS	U OF BERNE
OI - P.X. EBERHARDT	U OF BERNE
OI - H. BALSIGER	U OF BERNE
OI - C.R. CHAPPELL	NASA-MSFC
OI - A. GHIELMETTI	U OF BERNE
OI - D.T. YOUNG	U OF BERNE

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION WAS TO DETERMINE THE ION COMPOSITION AND ENERGY SPECTRA OF THE PLASMA WITHIN THE MAGNETOSPHERE, MAGNETOSHEATH, AND SOLAR WIND, AND TO DETERMINE THE ANGULAR DISTRIBUTION OF THE PLASMA IN THE MAGNETOSHEATH. AN ENERGETIC ION MASS SPECTROMETER WAS FLOWN THAT HAD AN ELECTROSTATIC ENERGY ANALYZER FOLLOWED BY A COMBINED CYLINDRICAL, ELECTROSTATIC/MAGNETIC MASS ANALYZER. A COMBINATION OF ELECTRON MULTIPLIERS WAS USED AS THE DETECTOR.

THE ENERGY-PER-UNIT-CHARGE RANGE MEASURED WAS FROM 0 TO 17 KEV/Q. THE MASS-PER-UNIT-CHARGE RANGE MEASURED EXTENDED FROM 1 TO GREATER THAN 150 U/Q.

----- ISEE 1, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC ELECTRONS AND PROTONS

NSSDC ID- 77-102A-09

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS
OI - C.O. BOSTROM
OI - B. WILKEN
OI - T.A. FRITZ
OI - G.H. WIDBERENZ
OI - E. KEPPLER

NOAA-ERL
APPLIED PHYSICS LAB
MPI-AERONOMY
NOAA-ERL
U OF KIEL
MPI-AERONOMY

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO IDENTIFY AND TO STUDY PLASMA INSTABILITIES RESPONSIBLE FOR ACCELERATION, SOURCE AND LOSS MECHANISMS, AND BOUNDARY AND INTERFACE PHENOMENA THROUGHOUT THE ORBITAL RANGE OF THE MOTHER/DAUGHTER SATELLITES. A PROTON TELESCOPE AND AN ELECTRON SPECTROMETER WERE FLOWN ON EACH SPACECRAFT TO MEASURE DETAILED ENERGY SPECTRUM AND ANGULAR DISTRIBUTIONS. THESE DETECTORS USED SILICON SURFACE BARRIER TOTALLY DEPLETED SOLID-STATE DEVICES OF VARIOUS THICKNESSES, AREAS, AND CONFIGURATIONS. PROTONS IN 8 OR 16 CHANNELS BETWEEN 20 KEV AND 1.2 MEV, AND ELECTRONS IN 8 OR 16 CHANNELS BETWEEN 20 KEV AND 1 MEV WERE MEASURED. A SEPARATE SOLID-STATE DETECTOR SYSTEM MEASURED THE ENERGY SPECTRA AND PITCH-ANGLE DISTRIBUTIONS OF ALPHA PARTICLES AND HEAVY IONS IN THE ENERGY RANGE ABOVE 125 KEV PER NUCLEON.

***** ISEE 2*****

SPACECRAFT COMMON NAME- ISEE 2

ALTERNATE NAMES- IMP-K PRIME, IME-D
10423, ISEE-B
DAUGHTER

NSSDC ID- 77-102B

LAUNCH DATE- 10/22/77

WEIGHT- 165.78 KG

LAUNCH SITE- CAPE CANAVERAL, UNITED STATES

LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY

INTERNATIONAL
UNITED STATES

ESA
NASA-ORIS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 3454.1 MIN
PERIAPSIS- 280. KM ALT

EPOCH DATE- 10/23/77

INCLINATION- 28.7 DEG
APOAPSIS- 138317. KM ALT

PERSONNEL

MG - J.R. HOLTZ
SC - E.R. SCHMERLING
PM - A. HAWKYARD
PS - A.C. DURNAY

NASA HEADQUARTERS
NASA HEADQUARTERS
ESA-ESTEC
ESA-ESTEC

BRIEF DESCRIPTION

THE EXPLORER CLASS DAUGHTER SPACECRAFT WAS PART OF THE MOTHER/DAUGHTER/HELIOCENTRIC MISSION (ISEE A, B, AND C). THE PURPOSES OF THE MISSION WERE -- (1) TO INVESTIGATE SOLAR-TERRRESTRIAL RELATIONSHIPS AT THE OUTERMOST BOUNDARIES OF THE EARTH'S MAGNETOSPHERE, (2) TO EXAMINE IN DETAIL THE STRUCTURE OF THE SOLAR WIND NEAR EARTH AND THE SHOCK WAVE THAT FORMS THE INTERFACE BETWEEN THE SOLAR WIND AND EARTH, AND (3) TO CONTINUE THE INVESTIGATION OF COSMIC RAYS AND SOLAR FLARES IN THE INTERPLANETARY REGION NEAR 1 AU. THE MISSION THUS EXTENDED THE INVESTIGATIONS OF PREVIOUS IMP SPACECRAFT. THE MOTHER/DAUGHTER PORTION OF THE MISSION CONSISTED OF TWO SPACECRAFT WITH A STATION-KEEPING CAPABILITY IN A HIGHLY ECCENTRIC EARTH ORBIT WITH APOGEE OF 23 EARTH RADII. THE SPACECRAFT MAINTAINED A SMALL SEPARATION DISTANCE, AND MADE SIMULTANEOUS COORDINATED MEASUREMENTS TO PERMIT SEPARATION OF SPATIAL FROM TEMPORAL IRREGULARITIES IN THE NEAR-EARTH SOLAR WIND, THE BOW SHOCK, AND INSIDE THE MAGNETOSPHERE. THE SPIN RATE OF THE SPACECRAFT WAS FIXED AT 19.8 RPM, DIFFERING SLIGHTLY FROM THE ISEE-A SPACECRAFT. FOR INSTRUMENT DESCRIPTIONS WRITTEN BY THE INVESTIGATORS, SEE IEEE TRANSACTIONS ON GEOSCIENCE ELECTRONICS, VOL. GE-16, NO. 3, JULY, 1978.

----- ISEE 2, ANDERSON-----

INVESTIGATION NAME- ELECTRONS AND PROTONS

NSSDC ID- 77-102B-08

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - K.A. ANDERSON
OI - C.I. MENG
OI - J.M. BOSQUED
OI - R. PELLAT
OI - F.V. CORONITI
OI - H. REME
OI - R.P. LIN
OI - G.K. PARKS

U OF CALIF, BERKELEY
APPLIED PHYSICS LAB
CESR
CTR FOR THEORETIC PHYS
U OF CALIF, LA
CESR
U OF CALIF, BERKELEY
U OF WASHINGTON

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO DETERMINE, BY USING IDENTICAL INSTRUMENTATION ON THE MOTHER/DAUGHTER SPACECRAFT, THE SPATIAL EXTENT, PROPAGATION VELOCITY, AND TEMPORAL BEHAVIOR OF A WIDE VARIETY OF PARTICLE PHENOMENA. ELECTRONS WERE MEASURED AT 2 AND 6 KEV AND IN TWO BANDS; 8 TO 200 KEV AND 30 TO 200 KEV. PROTONS WERE MEASURED AT 2 AND 6 KEV AND IN THREE BANDS; 8 TO 200 KEV, 30 TO 200 KEV, AND 200 TO 380 KEV. THE 30 KEV THRESHOLD COULD BE COMMANDED TO 15 OR 60 KEV. IDENTICAL INSTRUMENTATION ON EACH SPACECRAFT CONSISTS OF A PAIR OF SURFACE BARRIER SEMICONDUCTOR DETECTOR TELESCOPES (ONE WITH A FOIL AND ONE WITHOUT A FOIL) AND FOUR FIXED-ENERGY ELECTRIC FIELD PARTICLE ANALYZERS. THE TELESCOPES HAVE A VIEWING CONE WITH HALF ANGLE 40 DEGREES, ORIENTED AT ABOUT 20 DEGREES TO THE SPIN AXIS.

----- ISEE 2, FRANK-----

INVESTIGATION NAME- HOT PLASMA

NSSDC ID- 77-102B-03

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - L.A. FRANK
OI - V.M. VASYLIUNAS
OI - C.F. KENNEL

U OF IOWA
MPI-AERONOMY
U OF CALIF, LA

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO STUDY, BY MEANS OF IDENTICAL INSTRUMENTATION ON THE MOTHER/DAUGHTER SPACECRAFT, THE SPATIAL AND TEMPORAL VARIATIONS OF THE SOLAR WIND AND MAGNETOSHEATH ELECTRONS AND IONS. PROTONS AND ELECTRONS IN THE ENERGY RANGE FROM 1 EV TO 45 KEV WERE MEASURED IN 64 CONTIGUOUS ENERGY BANDS WITH AN ENERGY RESOLUTION (DELTA E/E) OF 0.16. A QUADRISPHERICAL LOW-ENERGY PROTON AND ELECTRON DIFFERENTIAL ENERGY ANALYZER (LEPEDEA), EMPLOYING SEVEN CONTINUOUS-CHANNEL ELECTRON MULTIPLIERS IN EACH OF ITS TWO (ONE FOR PROTONS AND ONE FOR ELECTRONS) ELECTROSTATIC ANALYZERS WAS FLOWN ON BOTH MOTHER AND DAUGHTER SPACECRAFT. ALL BUT 2 PERCENT OF THE 4 PI-SR SOLID-ANGLE WAS COVERED FOR PARTICLE VELOCITY VECTORS. A GM TUBE WAS ALSO INCLUDED, WITH A CONICAL FIELD OF VIEW OF 40 DEG FULL ANGLE, PERPENDICULAR TO THE SPIN AXIS. THIS DETECTOR WAS SENSITIVE TO ELECTRONS WITH E GREATER THAN OR EQUAL TO 45 KEV, AND PROTONS WITH E GREATER THAN OR EQUAL TO 600 KEV.

----- ISEE 2, GURNETT-----

INVESTIGATION NAME- PLASMA WAVES

NSSDC ID- 77-102B-05

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - D.A. GURNETT
OI - F.L. SCARF
OI - E.J. SMITH
OI - R.W. FREDERICKS

U OF IOWA
TRW SYSTEMS GROUP
NASA-JPL
TRW SYSTEMS GROUP

BRIEF DESCRIPTION

IN THIS EXPERIMENT, A SINGLE-AXIS SEARCH COIL MAGNETOMETER WITH A HIGH PERMEABILITY CORE AND TWO ELECTRIC FIELD DIPOLES (50 M AND 0.61 M) MEASURED WAVE PHENOMENON OCCURRING WITHIN THE MAGNETOSPHERE AND SOLAR WIND IN CONJUNCTION WITH A SIMILAR EXPERIMENT FLOWN ON THE MOTHER SPACECRAFT. THE ANTENNAS WERE MOUNTED PERPENDICULAR TO THE SPIN AXIS. THE INSTRUMENTATION WAS COMPOSED OF TWO ELEMENTS: (1) A HIGH TIME RESOLUTION SPECTRUM ANALYZER WITH 16 FREQUENCY CHANNELS (IDENTICAL TO THOSE ON ISEE 1) FROM 5.62 HZ TO 31.1 KHZ. ALL CHANNELS WERE SAMPLED 1 OR 4 TIMES PER S, DEPENDING ON BIT RATE; AND (2) A WIDE-BAND RECEIVER TO CONDITION ELECTRIC AND MAGNETIC WAVEFORMS FOR TRANSMISSION TO THE GROUND VIA THE SPECIAL-PURPOSE ANALOG TRANSMITTER. THERE WERE TWO BASIC FREQUENCY CHANNELS, FROM 10 HZ TO 1 KHZ AND FROM 650 HZ TO 10 KHZ. IN ADDITION, THE FREQUENCY RANGE COULD BE SHIFTED BY A FREQUENCY CONVERSION SCHEME TO ANY OF EIGHT RANGES UP TO 2.0 MHZ.

----- ISEE 2, HARVEY-----

INVESTIGATION NAME- RADIO PROPAGATION

NSSDC ID- 77-102B-06

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - C.C. HARVEY	PARIS OBSERVATORY
O1 - R.E. GENDRIN	CNET
O1 - J.R. MCAFEE	NOAA-ERL
O1 - M. PETIT	CNET
O1 - D. JONES	ESA-ESTEC
O1 - J.M. ETCHETO	CNET
O1 - R.J.L. GRARD	ESA-ESTEC

BRIEF DESCRIPTION

THE TOTAL ELECTRON CONTENT BETWEEN THE MOTHER AND DAUGHTER WAS OBTAINED BY MEASURING THE PHASE DELAY INTRODUCED BY THE AMBIENT PLASMA ONTO A WAVE OF FREQUENCY ABOUT 683 KHZ, TRANSMITTED FROM THE MOTHER (EXPERIMENT B) AND RECEIVED ON THE DAUGHTER. THE PHASE WAS COMPARED AGAINST A PHASE-COHERENT SIGNAL TRANSMITTED FROM THE MOTHER TO THE DAUGHTER BY MODULATION ONTO A CARRIER OF FREQUENCY HIGH ENOUGH (272.5 MHZ) TO BE UNAFFECTED BY THE AMBIENT PLASMA.

----- ISEE 2, KEPPLER-----

INVESTIGATION NAME- ENERGETIC ELECTRONS AND PROTONS

NSSDC ID- 77-102B-07

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - E. KEPPLER	MPI-AERONOMY
O1 - D.J. WILLIAMS	NOAA-ERL
O1 - T.A. FRITZ	NOAA-ERL
O1 - C.O. BOSTROM	APPLIED PHYSICS LAB
O1 - B. WILKEN	MPI-AERONOMY
O1 - G.H. WIBBERENZ	U OF KIEL

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO IDENTIFY AND TO STUDY PLASMA INSTABILITIES RESPONSIBLE FOR ACCELERATION, SOURCE AND LOSS MECHANISMS, AND BOUNDARY AND INTERFACE PHENOMENA THROUGHOUT THE ORBITAL RANGE OF MOTHER/ DAUGHTER SATELLITES. A PROTON TELESCOPE AND AN ELECTRON SPECTROMETER WERE FLOWN ON EACH SPACECRAFT TO MEASURE DETAILED ENERGY SPECTRA AND ANGULAR DISTRIBUTIONS. THESE DETECTORS USED SILICON, SURFACE-BARRIER, TOTALLY DEPLETED SOLID-STATE DEVICES OF VARIOUS THICKNESSES, AREAS, AND CONFIGURATIONS. PROTONS IN 5 DIRECTIONS AND 12 ENERGY CHANNELS BETWEEN 20 KEV AND 2 MEV AND ELECTRONS IN 5 DIRECTIONS AND 12 ENERGY CHANNELS BETWEEN 20 KEV AND 300 KEV (TO 1.2 MEV FOR 90 DEG) WERE MEASURED. DATA WAS ACCUMULATED IN UP TO 32 SECTORS PER SPIN.

----- ISEE 2, MORENO-----

INVESTIGATION NAME- SOLAR WIND IONS

NSSDC ID- 77-102B-02

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - G. MORENO	CNR, SPACE PLASMA LAB
O1 - P. CERULLI	CNR, SPACE PLASMA LAB
O1 - V. FORMISANO	CNR, SPACE PLASMA LAB
O1 - A. EGIDI	CNR, SPACE PLASMA LAB
O1 - S.C. CANTARANO	CNR, SPACE PLASMA LAB
O1 - S.J. BAME	LOS ALAMOS SCI LAB
O1 - G. PASCHMANN	MPI-EXTRATERR PHYS

BRIEF DESCRIPTION

THIS INSTRUMENT WAS DESIGNED TO MEASURE THE ANGULAR DISTRIBUTIONS AND ENERGY SPECTRA OF POSITIVE IONS IN THE SOLAR WIND. THE MAIN REGION OF INTEREST WAS OUTWARD FROM AND INCLUDING THE MAGNETOPAUSE (GREATER THAN 8 EARTH RADII). TWO HEMISPHERICAL ELECTROSTATIC ANALYZERS WERE USED TO COVER THE ENERGY RANGE 100 EV TO 10 KEV/Q IN UP TO 64 ENERGY CHANNELS. THERE WERE TWO OPERATING MODES: ONE FOR HIGH TIME RESOLUTION AND ONE FOR HIGH ENERGY RESOLUTION. ENERGY LEVELS WERE KEPT CONSTANT THROUGH A COMPLETE SPACECRAFT REVOLUTION.

----- ISEE 2, PASCHMANN-----

INVESTIGATION NAME- FAST PLASMA

NSSDC ID- 77-102B-01

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - G. PASCHMANN	MPI-EXTRATERR PHYS
O1 - W.C. FELDMAN	LOS ALAMOS SCI LAB
O1 - E.W. HONES, JR.	LOS ALAMOS SCI LAB
O1 - K. SCHINDLER	RUHR-U BOCHUM
O1 - H. MIGGENRIEDER	MPI-EXTRATERR PHYS
O1 - S.J. BAME	LOS ALAMOS SCI LAB
O1 - H. VOLK	MPI-NUCLEAR PHYS
O1 - H.R. ROSENBAUER	MPI-AERONOMY
O1 - M.D. MONTGOMERY	LOS ALAMOS SCI LAB
O1 - J.R. ASBRIDGE	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO STUDY THE PLASMA VELOCITY DISTRIBUTIONS AND THEIR SPATIAL AND TEMPORAL VARIATIONS IN THE SOLAR WIND, BOW SHOCK, MAGNETOSHEATH, MAGNETOPAUSE, AND MAGNETOTAIL (WITHIN THE MAGNETOSPHERE). ONE-, TWO-, AND THREE-DIMENSIONAL VELOCITY DISTRIBUTIONS FOR POSITIVE IONS AND ELECTRONS WERE MEASURED USING TWO 90-DEG SPHERICAL ELECTROSTATIC ANALYZER WITH CHANNELTRON ELECTRON MULTIPLIERS AS DETECTORS. IN CONJUNCTION WITH SIMILAR INSTRUMENTATION PROVIDED BY S. J. BAME/LASL FOR THE MOTHER SPACECRAFT, PROTONS FROM 50 EV TO 40 KEV (AND ELECTRONS FROM 5 EV TO 20 KEV) WERE MEASURED WITH 10 PERCENT ENERGY RESOLUTION IN TWO RANGES EACH.

----- ISEE 2, RUSSELL-----

INVESTIGATION NAME- FLUXGATE MAGNETOMETER

NSSDC ID- 77-102B-04

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - C.T. RUSSELL	U OF CALIF, LA
O1 - R.L. MCPHERRON	U OF CALIF, LA
O1 - P.C. HEDGECOCK	IMPERIAL COLLEGE
O1 - E.W. GREENSTADT	TRW SYSTEMS GROUP
O1 - M.G. KIVELSON	U OF CALIF, LA

BRIEF DESCRIPTION

IN THIS TRIAXIAL FLUXGATE MAGNETOMETER, THREE RING CORE SENSORS IN AN ORTHOGONAL TRIAD WERE ENCLOSED IN A FLIPPER MECHANISM AT THE END OF THE MAGNETOMETER BOOM. THE ELECTRONICS UNIT WAS ON THE MAIN BODY OF THE SPACECRAFT AT THE FOOT OF THE BOOM. THE MAGNETOMETER HAD TWO OPERATING RANGES OF PLUS OR MINUS 8192 NT AND PLUS OR MINUS 256 NT IN EACH VECTOR COMPONENT. THE DATA WERE DIGITIZED AND AVERAGED WITHIN THE INSTRUMENT TO PROVIDE INCREASED RESOLUTION AND TO PROVIDE NYQUIST FILTERING. THERE WERE TWO MODES FOR THE TRANSMISSION OF THE AVERAGED DATA. IN THE DOUBLE-PRECISION MODE OF OPERATION, 16-BIT SAMPLES OF DATA WERE TRANSMITTED. THIS PROVIDED A MAXIMUM RESOLUTION OF PLUS OR MINUS 1/4 NT OR 1/128 NT IN THE LOW- AND HIGH-SENSITIVITY RANGES.

***** ISEE 3*****

SPACECRAFT COMMON NAME- ISEE 3

ALTERNATE NAMES- STP PROBE, IME-H
HELIOCENTRIC, INTNL SUN EARTH EXPL-C
ISEE-C

NSSDC ID- 78-079A

LAUNCH DATE- 08/12/78 WEIGHT- 469. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- HELIOCENTRIC	EPOCH DATE- 11/25/78
ORBIT PERIOD- 365. DAYS	INCLINATION- 0. DEG
PERIAPSIS- 0.99 AU RAD	APOAPSIS- 0.99 AU RAD

PERSONNEL

MG - J.P. CORRIGAN	NASA HEADQUARTERS
SC - E.R. SCHMERLING	NASA HEADQUARTERS
PM - G. KOWALSKI	NASA-GSFC
PS - T.T. VON ROSENINGE	NASA-GSFC

BRIEF DESCRIPTION

THE EXPLORER CLASS HELIOCENTRIC SPACECRAFT WAS PART OF THE MOTHER/DAUGHTER/HELIOCENTRIC MISSION (ISEE A, B, AND C). THE PURPOSES OF THE MISSION WERE (1) TO INVESTIGATE SOLAR/TERRESTRIAL RELATIONSHIPS AT THE OUTERMOST BOUNDARIES OF THE EARTH'S MAGNETOSPHERE, (2) TO EXAMINE IN DETAIL THE STRUCTURE OF THE SOLAR WIND NEAR THE EARTH AND THE SHOCK WAVE THAT FORMS THE INTERFACE BETWEEN THE SOLAR WIND AND EARTH, AND (3) TO CONTINUE THE INVESTIGATION OF COSMIC RAYS AND SOLAR FLARES IN THE INTERPLANETARY REGION NEAR 1 AU. THE MISSION THUS EXTENDED THE INVESTIGATIONS OF PREVIOUS IMP SPACECRAFT. THE LAUNCH OF THREE COORDINATED SPACECRAFT IN THIS MISSION PERMITTED THE SEPARATION OF SPATIAL AND TEMPORAL EFFECTS. THE HELIOCENTRIC SPACECRAFT HAD A SPIN AXIS NORMAL TO THE ECLIPTIC PLANE AND A SPIN RATE OF ABOUT 20 RPM. IT WAS PLACED INTO AN ELLIPTICAL HALO ORBIT ABOUT THE LIBRATION POINT (L1) 235 EARTH RADII ON THE SUN SIDE OF THE EARTH, WHERE IT CONTINUOUSLY MONITORED CHANGES IN THE NEAR-EARTH INTERPLANETARY MEDIUM. BECAUSE BOTH THE MOTHER AND DAUGHTER SPACECRAFT HAD ECCENTRIC GEOCENTRIC ORBITS, IT WAS HOPED THAT THIS MISSION WOULD MEASURE THE CAUSE/EFFECT RELATIONSHIPS BETWEEN THE INCIDENT SOLAR PLASMA AND THE MAGNETOSPHERE. FINALLY, THE HELIOCENTRIC SPACECRAFT ALSO PROVIDED A NEAR-EARTH BASE FOR MAKING COSMIC-RAY AND OTHER PLANETARY MEASUREMENTS FOR COMPARISON WITH COINCIDENT MEASUREMENTS FROM DEEP-SPACE PROBES. FOR INSTRUMENT DESCRIPTIONS WRITTEN BY THE INVESTIGATORS, SEE IEEE TRANSACTIONS ON GEOSCIENCE ELECTRONICS, VOL. GE-14, NO. 3, JULY, 1978.

----- ISEE 3, ANDERSON-----

INVESTIGATION NAME- INTERPLANETARY AND SOLAR ELECTRONS

NSSDC ID- 78-079A-09

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS

PERSONNEL

PI - K.A. ANDERSON	U OF CALIF, BERKELEY
OI - R.P. LIN	U OF CALIF, BERKELEY
OI - D.F. SMITH	HIGH ALTITUDE OBS
OI - S.R. KANE	U OF CALIF, BERKELEY

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO STUDY SPECTRA AND ANISOTROPIES OF INTERPLANETARY AND SOLAR ELECTRONS (2 TO 1000 KEV) IN THE TRANSITION ENERGY RANGE BETWEEN SOLAR WIND AND LOW-ENERGY COSMIC RAYS. THE ELECTRONS WERE MEASURED BY A PAIR OF PASSIVELY COOLED, SURFACE BARRIER SEMICONDUCTOR DETECTOR TELESCOPES (APPROXIMATELY 15 KEV TO APPROXIMATELY 1 MEV) AND BY A HEMISPHERICAL PLATE ELECTROSTATIC ANALYZER WITH CHANNEL-MULTIPLIER DETECTORS (2-18 KEV). COUNTING RATES WERE SECTORED INTO ANGULAR SECTORS ABOUT EITHER THE MAGNETIC FIELD OR THE SUN DIRECTION. THE TELESCOPE YIELDED 8 OR 16 SECTORS; AND THE ANALYZER YIELDED 16 SECTORS.

----- ISEE 3, ANDERSON-----

INVESTIGATION NAME- X- AND GAMMA-RAY BURSTS

NSSDC ID- 78-079A-14

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
GAMMA-RAY ASTRONOMY

PERSONNEL

PI - K.A. ANDERSON	U OF CALIF, BERKELEY
OI - S.R. KANE	U OF CALIF, BERKELEY
OI - W.D. EVANS	LOS ALAMOS SCI LAB
OI - R.W. KLEBESADEL	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO PROVIDE CONTINUOUS COVERAGE OF SOLAR FLARE X RAYS AND TRANSIENT COSMIC GAMMA-RAY BURSTS. DETECTORS WERE A XENON-FILLED PROPORTIONAL COUNTER (5-14 KEV IN 6 CHANNELS) AND A SODIUM IODIDE SCINTILLATOR (12-1250 KEV IN 12 CHANNELS). THERE WERE FOUR OPERATING MODES: NORMAL, FLARE-1, FLARE-2, AND GAMMA BURST. IN NORMAL MODE, TIME RESOLUTION WAS 0.5 TO 4 S, DEPENDING ON THE CHANNEL. IN GAMMA BURST MODE, BEST TIME RESOLUTION WAS IN STORED DATA, WITH 0.25 TO 125 MS RESOLUTION.

----- ISEE 3, BAME-----

INVESTIGATION NAME- SOLAR WIND PLASMA

NSSDC ID- 78-079A-01

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - S.J. BAME	LOS ALAMOS SCI LAB
OI - J.R. ASBRIDGE	LOS ALAMOS SCI LAB
OI - E.W. HONES, JR.	LOS ALAMOS SCI LAB
OI - M.D. MONTGOMERY	LOS ALAMOS SCI LAB
OI - W.C. FELDMAN	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO MAKE AN INTEGRATED STUDY OF THE NATURE, ORIGIN AND EVOLUTION OF STRUCTURE IN THE INTERPLANETARY MEDIUM. ALSO, THE THERMAL STATE OF THE INTERPLANETARY PLASMA WAS STUDIED, UNPERTURBED BY THE EARTH'S BOW SHOCK. ION VELOCITY DISTRIBUTIONS WERE MEASURED BY A 135-DEG SPHERICAL ELECTROSTATIC ANALYZER IN BOTH TWO AND THREE DIMENSIONS. STEP ENERGY RESOLUTION FOR EACH ENERGY WINDOW WAS, 4.2 PERCENT. ELECTRON VELOCITY DISTRIBUTIONS WERE MEASURED BY A 90-DEG SPHERICAL ELECTROSTATIC ANALYZER, ALSO IN TWO AND THREE DIMENSIONS. THE ENERGY WINDOW PER STEP FOR ELECTRONS WAS 10 PERCENT. CHANNELTRON ELECTRON MULTIPLIERS WERE USED AS DETECTORS FOR EACH OF THE ANALYZERS. SOLAR WIND ELECTRONS WERE MEASURED IN 15 CONTIGUOUS CHANNELS FROM 8.5 TO 1140 EV. A SPECIAL PHOTOELECTRON RANGE OF 1.6 TO 220 EV COULD BE COMMANDED. VARIOUS MIXTURES OF DATA FOR 2-D AND 3-D DISTRIBUTION FUNCTIONS COULD BE SELECTED. IONS WERE MEASURED IN 32 CHANNELS FROM 237 EV PER CHARGE TO 10.7 KEV PER CHARGE. VARIOUS MODES WERE AVAILABLE, FOR BASIC SWEEP, SEARCH, AND TRACKING OF THE PEAK OF THE DISTRIBUTION.

----- ISEE 3, HECKMAN-----

INVESTIGATION NAME- HIGH-ENERGY COSMIC RAY

NSSDC ID- 78-079A-05

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - H.H. HECKMAN	LAWRENCE BERKELEY LAB
OI - D.E. GREINER	U OF CALIF, BERKELEY

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO DETERMINE THE ISOTOPIC ABUNDANCE IN THE PRIMARY COSMIC RAYS FOR HYDROGEN THROUGH NICKEL. THE INSTRUMENT USED A 10-ELEMENT, SOLID-STATE, PARTICLE TELESCOPE CONSISTING OF LITHIUM-DRIFTED SILICON DETECTORS. ENERGY RANGES MEASURED RAN FROM APPROXIMATELY 20 TO APPROXIMATELY 500 MEV PER NUCLEON. DIRECTION OF INCIDENT NUCLEI WAS OBTAINED FROM A SIX-PLANE DRIFT CHAMBER WITH 2-DEG RESOLUTION.

----- ISEE 3, HOVESTADT-----

INVESTIGATION NAME- LOW-ENERGY COSMIC RAYS

NSSDC ID- 78-079A-03

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - D.K. HOVESTADT	MPI-EXTRATERR PHYS
OI - J.J. O'GALLAGHER	U OF MARYLAND
OI - C.Y. FAN	U OF ARIZONA
OI - G. GLOECKLER	U OF MARYLAND
OI - M. SCHOLER	MPI-EXTRATERR PHYS
OI - L.A. FISK	U OF NEW HAMPSHIRE

BRIEF DESCRIPTION

THIS INSTRUMENT, CARRIED ON ISEE 1 AND ISEE 3, WAS DESIGNED TO MEASURE SOLAR, INTERPLANETARY, AND MAGNETOSPHERIC ENERGETIC IONS IN NUMEROUS BANDS WITHIN THE ENERGY RANGE 2 KEV/NUCLEON TO 80 MEV/NUCLEON, AND ELECTRONS IN FOUR CONTIGUOUS BANDS FROM 75 TO 1300 KEV. AT THE LOWER ENERGIES, CHARGE STATES OF HEAVY IONS IN THE HIGH SPEED (GREATER THAN 500 KM/S) SOLAR WIND WERE DETERMINED. IN THE RANGE 0.3 TO 80 MEV/NUCLEON, THE ENERGY SPECTRA, ANISOTROPIES, AND COMPOSITION OF ENERGETIC IONS WERE DETERMINED. IN THE LIMITED RANGE 0.4 TO 6 MEV/NUCLEON, SIMULTANEOUS DETERMINATION OF IONIC AND NUCLEAR CHARGE WAS POSSIBLE. THE INSTRUMENT CONSISTED OF THREE DIFFERENT SENSOR SYSTEMS. ULECA (ULTRALOW-ENERGY CHARGE ANALYZER) WAS AN ELECTROSTATIC ANALYZER WITH SOLID STATE DETECTORS. ITS ENERGY RANGE WAS APPROXIMATELY 3 TO 560 KEV/CHARGE. ULEWAT (ULTRALOW-ENERGY WIDE-ANGLE TELESCOPE) WAS A DE/DX - E THIN-WINDOW FLOW THROUGH PROPORTIONAL COUNTER/SOLID STATE DETECTOR TELESCOPE COVERING THE RANGE 0.2 TO 80 MEV/NUCLEON (FE). ULEZEQ (ULTRALOW-ENERGY Z, E, AND Q) WAS A COMBINATION OF AN ELECTROSTATIC ANALYZER AND A DE/DX - E SYSTEM WITH A THIN-WINDOW PROPORTIONAL COUNTER AND A POSITION-SENSITIVE SOLID STATE DETECTOR. THE ENERGY RANGE WAS 0.4 TO 6 MEV/NUCLEON. DATA COULD BE OBTAINED IN 45-DEG SECTORS.

----- ISEE 3, HYNDS-----

INVESTIGATION NAME- ENERGIEYC PROTONS

NSSDC ID- 78-079A-08

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - R.J. HYNDS	IMPERIAL COLLEGE
OI - J.J. VAN ROOIJEN	U OF UTRECHT
OI - J.W. VAN GILS	U OF UTRECHT
OI - R.M. VAN DEN NIEUWENHOF	U OF UTRECHT
OI - K.P. WENZEL	ESA-ESTEC
OI - A.C. DURNERY	ESA-ESTEC
OI - T.R. SANDERSON	ESA-ESTEC
OI - V. DOMINGO	ESA-ESTEC
OI - D.E. PAGE	ESA-ESTEC
OI - A. BALOGH	IMPERIAL COLLEGE
OI - C. DE JAGER	U OF UTRECHT
OI - H. ELLIOT	IMPERIAL COLLEGE

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO STUDY LOW-ENERGY SOLAR PROTON ACCELERATION AND PROPAGATION PROCESSES IN INTERPLANETARY SPACE. THE INSTRUMENT MEASURED THE ENERGY SPECTRUM IN 8 CHANNELS, AND THE 3-DIMENSIONAL ANGULAR DISTRIBUTION OF PROTONS IN THE ENERGY RANGE 0.035 TO 1.6 MEV WITH A BASIC TIME RESOLUTION OF 16 S. COUNTS OF EACH CHANNEL WERE GROUPED INTO EIGHT 45-DEG SECTORS. THE INSTRUMENT CONSISTED OF THREE IDENTICAL TELESCOPES MOUNTED AT 30, 60, AND 135 DEG RELATIVE TO THE SPACECRAFT SPIN AXIS, EACH CONTAINING TWO SURFACE BARRIER DETECTORS, A MECHANICAL COLLIMATOR, AND A 'BROOM' MAGNET TO SWEEP AWAY ELECTRONS.

----- ISEE 3, MEYER-----

INVESTIGATION NAME- COSMIC-RAY ELECTRONS AND NUCLEI

NSSDC ID- 78-079A-06

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - P. MEYER	U OF CHICAGO
OI - P. EVENSON	U OF CHICAGO

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO STUDY PARTICLE PROPAGATION WITHIN THE SOLAR SYSTEM AND THE PROPERTIES OF THE INTERPLANETARY MEDIUM. THE FOLLOWING SPECIES WERE RESOLVED: (1) ELECTRONS (DIFFERENTIAL SPECTRUM FROM 5 TO 400 MEV); (2) NUCLEI FROM PROTONS TO THE IRON GROUP (DIFFERENTIAL SPECTRA AND RELATIVE ABUNDANCES FROM 30 TO 15,000 MEV/NUCLEON); AND (3) HELIUM THROUGH SULFUR. A CHARGE PARTICLE TELESCOPE WAS USED TO MAKE THESE MEASUREMENTS. IT CONSISTED OF THREE SOLID-STATE DETECTORS, A GAS CERENKOV COUNTER, A CESIUM IODIDE SCINTILLATION DETECTOR, TWO PLASTIC SCINTILLATION COUNTERS, AND A QUARTZ CERENKOV COUNTER. THE DESIGN OF THE TELESCOPE WAS BASED ON THAT USED IN EXPERIMENT 68-014A-09 FOR OGO 5.

----- ISEE 3, OGILVIE-----

INVESTIGATION NAME- SOLAR WIND ION COMPOSITION

NSSDC ID- 78-079A-11

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - K.W. OGILVIE	NASA-GSFC
OI - J. GEISS	U OF BERNE
OI - M.H. ACUNA	NASA-GSFC
OI - M.A. COPLAN	U OF MARYLAND
OI - D.L. LIND	NASA-JSC

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A HEMISPHERICAL ELECTROSTATIC ENERGY ANALYZER AND A WIEN VELOCITY FILTER CONFIGURED AS A MASS SPECTROMETER TO DETERMINE THE CHARGE STATE AND ISOTOPIC CONSTITUTION OF THE SOLAR WIND. THE INSTRUMENT HAD AN ENERGY PER UNIT CHARGE RANGE OF 0.84 TO 11.7 KEV PER CHARGE, A MASS PER UNIT CHARGE RANGE OF 1.5 TO 5.6 U PER CHARGE, AND A VELOCITY RANGE OF 300 TO 600 KM/S.

----- ISEE 3, SCARF-----

INVESTIGATION NAME- PLASMA WAVES

NSSDC ID- 78-079A-07

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - F.L. SCARF	TRW SYSTEMS GROUP
OI - D.A. GURNEY	U OF IOWA
OI - E.J. SMITH	NASA-JPL
OI - R.W. FREDERICKS	TRW SYSTEMS GROUP

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO PROVIDE DATA FOR PLASMA WAVE STUDIES UNDERTAKEN TO GAIN A BETTER UNDERSTANDING OF THE WAVE PARTICLE INTERACTION AND PLASMA INSTABILITIES, WHICH LEAD TO THE EQUIVALENT COLLISION PHENOMENA THAT PRODUCE APPARENT FLUID-LIKE BEHAVIOR IN THE SOLAR WIND NEAR 1 AU. TWO ELECTRIC DIPOLES AND A MAGNETIC SEARCH COIL, BOOM-MOUNTED, WERE USED TO MEASURE MAGNETIC AND ELECTRIC FIELD WAVE LEVELS FROM 17 HZ TO 1 KHZ IN EIGHT CHANNELS AND ELECTRIC FIELD LEVELS FROM 17 HZ TO 100 KHZ IN 16 CHANNELS. IN ADDITION, A THIRD SPECTRUM ANALYZER WITH 3 BANDS BETWEEN 0.316 AND 8.8 HZ WAS INCLUDED FOR MEASUREMENT OF THE MAGNETIC FIELD. THIS UNIT USED THE SEARCH COIL, BUT WAS LOCATED WITHIN THE ELECTRONICS UNIT OF EXPERIMENT 78-079A-02.

----- ISEE 3, SMITH-----

INVESTIGATION NAME- MAGNETIC FIELDS

NSSDC ID- 78-079A-02

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY MAGNETIC FIELDS
PARTICLES AND FIELDS

PERSONNEL

PI - E.J. SMITH	NASA-JPL
OI - L. DAVIS, JR.	CALIF INST OF TECH
OI - G.L. SISCOE	U OF CALIF, LA
OI - D.E. JONES	BRIGHAM YOUNG U
OI - B.T. TSURUTANI	NASA-JPL

BRIEF DESCRIPTION

THE INSTRUMENTATION FOR THIS EXPERIMENT CONSISTED OF A BOOM-MOUNTED, TRIAXIAL VECTOR HELIUM MAGNETOMETER. MEASUREMENTS WERE MADE OF THE STEADY MAGNETIC FIELD AND ITS LOW-FREQUENCY VARIATIONS. EIGHT FIELD AMPLITUDE RANGES (MINUS TO PLUS 4, 14, 42, 144, 640, 4000, 22,000, AND 140,000 NT) WERE AVAILABLE. THE INSTRUMENT RANGED UP AND DOWN AUTOMATICALLY OR COULD BE COMMANDED INTO A SPECIFIC RANGE. THE FIELD EQUIVALENT NOISE POWER SPECTRAL DENSITY WAS $2.E-4$ NT SQUARED PER HERTZ (INDEPENDENT OF FREQUENCY), OR 0.01 NT RMS IN THE PASSBAND 0 TO 0.5 HZ. A SINGLE-AXIS SPECTRUM ANALYZER MEASURED FLUCTUATIONS PARALLEL TO THE SPACECRAFT SPIN AXIS IN THREE FREQUENCY BANDS CENTERED AT 0.33, 3.2, AND 8.8 HZ.

----- ISEE 3, STEINBERG-----

INVESTIGATION NAME- RADIO MAPPING

NSSDC ID- 78-079A-10

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
RADIO PHYSICS
SOLAR PHYSICS

PERSONNEL

PI - J.L. STEINBERG	PARIS OBSERVATORY
OI - P. COUTURIER	PARIS OBSERVATORY
OI - R. KNOLL	PARIS OBSERVATORY
OI - J. FAIBERG	NASA-GSFC
OI - R.G. STONE	NASA-GSFC
OI - S.R. MOSIER	NATL SCIENCE FOUND

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO MEASURE THE DIRECTION (2 ANGLES) OF TYPE III SOLAR BURSTS AT 24 FREQUENCIES STEPPED FROM 30 KHZ TO 2 MHZ. RELYING ON SOLAR ROTATION, ONE COULD OBTAIN THE 3-D MAP OF THE MAGNETIC LINES OF FORCE, WHICH GUIDE THE ELECTRONS THAT PRODUCE TYPE III SOLAR BURSTS FROM 10 SOLAR RADII TO 1 AU IN OR OUT OF THE ECLIPTIC. THE INSTRUMENT CONSISTED PRIMARILY OF TWO DIPOLE ANTENNAS AND A FOUR-CHANNEL RADIOMETER, WITH BANDWIDTHS OF 3 KHZ AND 10 KHZ. FREQUENCY SEQUENCE WAS 72 STEPS COVERING 108 S. SELF-CALIBRATION OCCURRED EVERY 18 H.

----- ISEE 3, STONE-----

INVESTIGATION NAME- HIGH-ENERGY COSMIC RAYS

NSSDC ID- 78-079A-12

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL
PI - E.C. STONE
OI - R.E. VOGT

CALIF INST OF TECH
CALIF INST OF TECH

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO STUDY THE ISOTOPIC CONSTITUTION OF SOLAR MATTER AND GALACTIC COSMIC-RAY SOURCES, THE PROCESSES OF NUCLEOSYNTHESIS IN THE SUN AND IN THE GALAXY, AND THE ASTROPHYSICAL PARTICLE ACCELERATION PROCESSES. THE FOLLOWING SPECIES WERE RESOLVED -- LITHIUM THROUGH NICKEL (Z FROM 3 THROUGH 28 AND A FROM 6 THROUGH 64) IN THE ENERGY RANGE FROM 5 TO 250 MEV/NUCLEON. THE MASS RESOLUTION WAS LESS THAN OR APPROXIMATELY EQUAL TO 0.3 U FOR Z LESS THAN OR EQUAL TO 30.

----- ISEE 3, TEEGARDEN-----

INVESTIGATION NAME- GAMMA-RAY BURSTS

NSSDC ID- 78-079A-15

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
GAMMA-RAY ASTRONOMY

PERSONNEL

PI - B.J. TEEGARDEN
OI - D.K. HOVESTADT
OI - T.L. CLINE
OI - G. GLOECKLER

NASA-GSFC
MPI-EXTRATERR PHYS
NASA-GSFC
U OF MARYLAND

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO RECOGNIZE AND RECORD THE TIME HISTORY OF GAMMA-RAY BURSTS, AND TO PROVIDE HIGH-RESOLUTION SPECTRA OF GAMMA-RAY BURST PHOTONS BETWEEN 0.05 AND 6.5 MEV. THE DETECTORS WERE: (1) A 4 CM DIAM. BY 3 CM THICK GERMANIUM CRYSTAL, RADIATIVELY COOLED TO OPERATE AT APPROXIMATELY 101 DEGREES K. ENERGY RESOLUTION WAS LESS THAN 3.5 KEV AT 1 MEV. A 4096-CHANNEL ADC DIGITIZED THE SIGNALS FOR INPUT TO THE GAMMA-BURST DIGITAL INSTRUMENTATION, WHICH WAS IN THE LOW-ENERGY COSMIC RAY EXPERIMENT, 78-079A-03; (2) THE CESIUM IODIDE AND SURROUNDING DETECTORS IN THE COSMIC RAY ELECTRONS AND NUCLEI EXPERIMENT, 78-079A-06. BOTH TEMPORAL AND SPECTRAL INFORMATION WERE OBTAINED FROM THIS DETECTOR; AND (3) A SMALLER CESIUM IODIDE CRYSTAL IN EXPERIMENT 78-079A-03. TWO TIME HISTORY MEMORIES OF 2000 12-BIT WORDS WERE USED, FED FROM ANY OF THE 3 DETECTORS BY COMMAND. THE STORED VALUES WERE TIME INTERVALS OVER WHICH A FIXED NUMBER (1-128) OF COUNTS WAS ACCUMULATED. THE TIME INTERVAL CLOCK FREQUENCY WAS SELECTABLE FROM 1 TO 8 KHZ. SPECTRAL INFORMATION FROM EITHER OF DETECTORS (1) AND (2) IS STORED IN A THIRD MEMORY OF 3072 16-BIT WORDS. TWELVE BITS WERE USED FOR PULSE HEIGHT DATA AND FOUR BITS FOR TIME. THE COUNTING RATES INPUT TO THE TIME HISTORY MEMORIES CAUSED A TRIGGER TO OCCUR IF RATES EXCEEDED A COMMANDABLE VALUE. WHEN THIS OCCURRED, ALL THREE MEMORIES WERE ALLOWED TO FILL. THEY COULD BE DUMPED AT A VERY LOW BIT RATE EITHER AUTOMATICALLY OR BY COMMAND.

----- ISEE 3, VON ROSENVINGE-----

INVESTIGATION NAME- MEDIUM ENERGY COSMIC RAY

NSSDC ID- 78-079A-04

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - T.T. VON ROSENVINGE
OI - L.A. FISK
OI - F.B. McDONALD
OI - J.H. TRAINOR
OI - M.A. VAN HOLLEBEKE

NASA-GSFC
U OF NEW HAMPSHIRE
NASA-GSFC
NASA-GSFC
U OF MARYLAND

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO STUDY THE COMPOSITION OF SOLAR COSMIC RAYS FROM HYDROGEN THROUGH IRON AND THE ELEMENTAL ABUNDANCE OF GALACTIC COSMIC RAYS. THREE COSMIC RAY TELESCOPES, PLUS A PROPORTIONAL COUNTER FOR MEASUREMENT OF ELECTRONS AND X RAYS, COMPRISED THE INSTRUMENTATION. NUCLEI WITH Z BETWEEN 1 AND 30 WERE MEASURED IN VARIOUS ENERGY WINDOWS IN THE RANGE 1 TO 500 MEV/NUCLEON. UNIT MASS RESOLUTION WAS OBTAINED FOR ISOTOPES WITH Z EQUAL 1, 2, AND 3 TO 7 IN THE ENERGY RANGES 4 TO 70, 1 TO 70, AND 30 TO 140 MEV/NUCLEON, RESPECTIVELY. ELECTRONS WERE MEASURED IN THE ENERGY RANGE APPROXIMATELY 2 TO 10 MEV. ANISOTROPY INFORMATION WAS OBTAINED FOR THE ELECTRONS AND NUCLEI WITH Z EQUAL 1 TO 26.

----- ISEE 3, WILCOX-----

INVESTIGATION NAME- GROUND BASED SOLAR STUDIES

NSSDC ID- 78-079A-13

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
INTERPLANETARY MAGNETIC FIELDS

PERSONNEL
PI - J.M. WILCOX

STANFORD U

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF THE MEASUREMENT OF LARGE-SCALE SOLAR MAGNETIC AND VELOCITY FIELDS WITH THE STANFORD GROUND-BASED SOLAR TELESCOPE, AND THE COMPARISON OF THESE MEASUREMENTS WITH MEASUREMENTS OF THE INTERPLANETARY MAGNETIC FIELD AND SOLAR WIND MADE BY OTHER EXPERIMENTS ON THIS SPACECRAFT. THE PURPOSE OF THE EXPERIMENT WAS TO STUDY THE LARGE-SCALE STRUCTURE OF THE SOLAR MAGNETIC FIELD AND ITS EXTENSION INTO INTERPLANETARY SPACE BY THE SOLAR WIND.

***** ISIS 1*****

SPACECRAFT COMMON NAME- ISIS 1
ALTERNATE NAMES- ISIS-A, 03669

NSSDC ID- 69-009A

LAUNCH DATE- 01/30/69

WEIGHT- 241. KG

LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY

CANADA

CRC

UNITED STATES

NASA-OSS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 128.42 MIN
PERIAPSIS- 578. KM ALT

EPOCH DATE- 02/04/69

INCLINATION- 88.42 DEG

APOAPSIS- 3526. KM ALT

PERSONNEL

MG - F.W. GAETANO
MG - C.A. FRANKLIN
PM - L.H. BRACE
PS - L.H. BRACE
PS - G.L. NELMS

NASA HEADQUARTERS
COMMUN RESEARCH CENTRE
NASA-GSFC
NASA-GSFC
DEFENCE RESEARCH ESTAB

BRIEF DESCRIPTION

ISIS 1 WAS AN IONOSPHERIC OBSERVATORY INSTRUMENTED WITH SWEEP- AND FIXED-FREQUENCY IONOSONDES, A VLF RECEIVER, ENERGETIC AND SOFT PARTICLE DETECTORS, AN ION MASS SPECTROMETER, AN ELECTROSTATIC PROBE, AN ELECTROSTATIC ANALYZER, A BEACON TRANSMITTER, AND A COSMIC NOISE EXPERIMENT. THE SOUNDER USED TWO DIPOLE ANTENNAS (73 AND 18.7 M LONG, RESPECTIVELY). THE SATELLITE WAS SPIN-STABILIZED AT ABOUT 2.9 RPM AFTER ANTENNA DEPLOYMENT. SOME CONTROL COULD BE EXERCISED OVER THE SPIN RATE AND ATTITUDE BY USING MAGNETICALLY INDUCED TORQUES TO CHANGE THE SPIN RATE AND TO PRECESS THE SPIN AXIS. A TAPE RECORDER WITH 1-H CAPACITY WAS INCLUDED ON THE SATELLITE. THE SATELLITE COULD BE PROGRAMMED TO TAKE RECORDED OBSERVATIONS FOR FOUR DIFFERENT TIME PERIODS FOR EACH FULL RECORDING PERIOD. THE RECORDER DATA WERE DUMPED ONLY AT OTTAWA. FOR NON-TAPE-RECORDED OBSERVATIONS, DATA FOR THE SATELLITE AND SUBSATELLITE REGIONS COULD BE ACQUIRED AND TELEMETERED WHEN THE SPACECRAFT WAS IN THE LINE OF SIGHT OF TELEMETRY STATIONS. THE SELECTED TELEMETRY STATIONS WERE IN AREAS THAT PROVIDED PRIMARY DATA COVERAGE NEAR THE 80 DEG W MERIDIAN AND IN AREAS NEAR HAWAII, SINGAPORE, AUSTRALIA, ENGLAND, NORWAY, INDIA, JAPAN, ANTARCTICA, NEW ZEALAND, AND CENTRAL AFRICA.

----- ISIS 1, BARRINGTON-----

INVESTIGATION NAME- VLF RECEIVER

NSSDC ID- 69-009A-03

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - R.E. BARRINGTON
OI - F.H. PALMER

COMMUN RESEARCH CENTRE
COMMUN RESEARCH CENTRE

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT WAS TO STUDY NATURAL AND MANMADE VLF SIGNALS. SPECIFIC OBJECTIVES INCLUDED THE INVESTIGATION OF VLF PROPAGATION PHENOMENA, ION AND HYBRID PLASMA RESONANCES, AND CORRELATIONS BETWEEN VLF EMISSIONS AND INTENSE FLUXES OF ENERGETIC PARTICLES. IN THIS EXPERIMENT AN ATTEMPT WAS MADE TO STIMULATE THE ION RESONANCES OF THE AMBIENT PLASMA BY USING SIGNALS FROM A VLF SWEEP-FREQUENCY EXCITER, CONTAINED WITHIN THE SPACECRAFT. THE INSTRUMENTATION CONSISTED OF A LOW-FREQUENCY, BROADBAND RECEIVER THAT SENSED SIGNALS RECEIVED BY THE 73 M DIPOLE (SPLIT MONOPOLE) ANTENNA, BETWEEN 0.05 AND 30 KHZ. THIS SAME ANTENNA WAS USED FOR RECEIVING FREQUENCIES BELOW 5 MHZ ON THE IONOSONDE. THE RECEIVER HAD A WIDE DYNAMIC RANGE (80 DB) THAT WAS ACHIEVED BY USE OF AN AUTOMATIC GAIN CONTROL SYSTEM. THIS VLF EXPERIMENT INCLUDED AN OPTIONAL-USE ONBOARD EXCITER THAT OPERATED OVER A FREQUENCY CYCLE FROM 0 TO 0.3 TO 0 TO 11 TO 0 KHZ OVER A 3.5-S 'FRAME' PERIOD. THE FRAMES SEQUENCED THROUGH FOUR STEPS WHERE THE TRANSMISSIONS WERE ATTENUATED BY 0, 20, 20, THEN 40 DB, THUS REQUIRING 14 S FOR ONE COMPLETE CYCLE OF EXCITER OPERATION. THE EXCITER TRANSMITTED ON THE SHORT ANTENNAS AND THE RECEIVER SENSED THE SIGNALS COUPLED BETWEEN THE TWO ANTENNAS BY THE AMBIENT PLASMA, PLUS ANY NOISE SIGNALS WHICH WERE EXCITED IN THE PLASMA. THIS VLF EXPERIMENT ALSO PERMITTED ANTENNA

IMPEDANCE MEASUREMENTS, WITH OR WITHOUT A DC BIAS ON THE ANTENNA. THE REAL-TIME DATA WERE TRANSMITTED ON 136.08-MHZ TELEMETRY. THE VLF DATA COULD BE RECORDED ON ONE OF THE FOUR TAPE RECORDER CHANNELS DURING THE TIME THE TAPE RECORDER OPERATED. TAPE-RECORDED (AND BACK-UP REAL-TIME) DATA WERE TRANSMITTED ON 400-MHZ TELEMETRY.

----- ISIS 1, BRACE-----

INVESTIGATION NAME- CYLINDRICAL ELECTROSTATIC PROBE

NSSDC ID- 69-009A-07

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - L.H. BRACE
OI - J.A. FINDLAY

NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT WAS TO STUDY THE GLOBAL VARIATIONS OF ELECTRON TEMPERATURE AND ELECTRON CONCENTRATION AT SPACECRAFT (SC) ALTITUDES DURING SOLAR MAXIMUM, AND TO STUDY CHARACTERISTICS OF THE SC ION SHEATH. THE MEASUREMENTS WERE MADE WITH TWO CYLINDRICAL PROBES, OPERATING AS LANGMUIR PROBES. FROM THE PROBE CURRENT-VERSUS-VOLTAGE DATA, THE ELECTRON DENSITY AND ELECTRON TEMPERATURE COULD BE CALCULATED. THERE WAS A BOOM PROBE AND AN AXIAL PROBE. THE AXIAL PROBE EXTENDED 48.3 CM FROM THE SC, ALONG THE SPIN AXIS, AND WAS CENTERED AMONG THE FOUR TELEMETRY ANTENNAS ON THE UNDERSIDE OF THE SC. THIS PROBE WAS CAPABLE OF MEASUREMENTS UNDISTURBED BY THE SATELLITE MOTION ONLY WHEN THE PROBE PRECEDED THE SC IN ITS MOTION THROUGH THE PLASMA. THE BOOM PROBE EXTENDED HORIZONTALLY AND OUTWARD (IN SC FRAME OF REFERENCE) FROM A BOOM 1 M LONG, WHICH IN TURN EXTENDED FROM AN UPPER SURFACE OF THE SATELLITE AT AN ANGLE OF ABOUT 45 DEG TO THE SPIN AXIS. THIS PROBE PROVIDED SOME OBSERVATIONS DURING EACH SC SPIN CYCLE THAT WAS FREE OF SC WAKE EFFECTS. THE PROBES CONSISTED OF THREE CONCENTRIC, ELECTRICALLY ISOLATED, STAINLESS STEEL TUBES. THE OUTER (0.24-CM DIAM AND 23-CM LONG) TUBE FLOATED AT ITS OWN EQUILIBRIUM POTENTIAL AND SERVED TO PLACE THE COLLECTOR WELL AWAY FROM THE SC PLASMA SHEATH. THE CENTER TUBE (0.165-CM DIAM) EXTENDING 23 CM OUTWARD FROM THE OUTER TUBE ACTED AS AN ELECTRICAL GUARD FOR THE COLLECTOR. ITS ELECTRICAL POTENTIAL WAS CONTROLLED. THE COLLECTOR (0.058-CM DIAM) EXTENDED 23 CM OUTWARD FROM THE DRIVEN GUARD. DURING EACH 2-MIN SEQUENCE, A VOLT-AMPERE CURVE WAS OBTAINED FROM THE SAWTOOTH VOLTAGE (-2 TO +10V) APPLIED TO THE COLLECTOR. THIS CAN BE INTERPRETED IN ELECTRON DENSITIES OVER A RANGE FROM 1.62 TO 1.56 ELECTRONS PER CUBIC CM, AND TEMPERATURES FROM ABOUT 400 TO 50,000 K.

----- ISIS 1, CALVERT-----

INVESTIGATION NAME- FIXED-FREQUENCY SOUNDER

NSSDC ID- 69-009A-02

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - W. CALVERT
OI - R.B. NORTON
OI - J.M. WARMOCK
OI - G.L. NELMS
OI - G.E.K. LOCKWOOD
OI - J.H. WHITTEKER
OI - C.E. PETRIE
OI - T.E. VAN ZANDT

U OF COLORADO
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NOAA
DEFENCE RESEARCH ESTAB
COMMUN RESEARCH CENTRE
COMMUN RESEARCH CENTRE
COMMUN RESEARCH CENTRE
NOAA-ERL

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO STUDY IONOSPHERIC FEATURES OF A SMALLER SCALE THAN COULD BE DETECTED BY THE SWEEP SOUNDER, AND TO STUDY PLASMA RESONANCES. PARAMETERS MEASURED WERE VIRTUAL RANGE (A FUNCTION OF PROPAGATION TIME OF THE REFLECTED PULSE) AND TIME. THESE DATA WERE NORMALLY OBSERVED ONLY WHEN THE SPACECRAFT WAS IN RANGE OF A TELEMETRY STATION. THE FIXED-FREQUENCY SOUNDER OPERATED FROM THE SAME ANTENNA, TRANSMITTER, AND RECEIVER USED FOR THE SWEEP-FREQUENCY EXPERIMENT. IT NORMALLY OPERATED FOR 5 S DURING THE FREQUENCY FLYBACK PERIOD OF THE SWEEP-FREQUENCY OPERATION THAT WAS EVERY 19 OR 29 S. ONE OF SIX FREQUENCIES (0.25, 0.48, 1.00, 1.95, 4.00, OR 9.303 MHZ) WAS CHOSEN FOR USE BY THE EXPERIMENTER AS DESIRED. OTHER MODES OF OPERATION WERE AVAILABLE, INCLUDING CONTINUOUS OBSERVATION AT A SELECTED FREQUENCY, AND A SPECIAL MIXED MODE WITH TRANSMISSION AT THE FIXED FREQUENCY OF 0.82 MHZ AND SWEEP RECEPTION.

----- ISIS 1, HARTZ-----

INVESTIGATION NAME- COSMIC RADIO NOISE

NSSDC ID- 69-009A-10

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - T.R. HARTZ

COMMUN RESEARCH CENTRE

BRIEF DESCRIPTION

THIS EXPERIMENT USED THE SWEEP FREQUENCY IONOSONDE RECEIVER AUTOMATIC GAIN CONTROL (AGC) VOLTAGES TO MEASURE GALACTIC AND SOLAR RADIO NOISE LEVELS. THE RECEIVER SWEEPED FROM 0.1 TO 20 MHZ. THE DYNAMIC RANGE WAS 50 DB, AND THE BANDWIDTH WAS 55 KHZ. THE ANTENNAS USED WERE 18.7-M AND 73-M DIPOLES.

----- ISIS 1, MCDIARMID-----

INVESTIGATION NAME- ENERGETIC PARTICLE DETECTORS

NSSDC ID- 69-009A-04

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - I.B. MCDIARMID
OI - J.R. BURROWS
OI - R.C. ROSE

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BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT WAS TO PROVIDE DATA THAT WILL AID IN UNDERSTANDING (1) THE MECHANISMS RESPONSIBLE FOR THE PRODUCTION AND CONTROL OF THE OUTER RADIATION ZONE, (2) THE RELATED PROBLEMS OF PARTICLE ENTRY INTO THE EARTH'S MAGNETIC FIELD, AND (3) INTERACTIONS BETWEEN THE EARTH'S MAGNETOSPHERE AND THE SOLAR WIND. THIS EXPERIMENT CONSISTED OF FOUR SETS OF DETECTORS. THE FIRST SET, COMPRISING FOUR GEIGER COUNTERS, MEASURED ELECTRONS GREATER THAN 20 AND 40 KEV AND PROTONS GREATER THAN 300 AND 500 KEV PARALLEL AND PERPENDICULAR TO THE SATELLITE SPIN AXIS. ALL REMAINING DETECTORS MEASURED PARTICLES PERPENDICULAR TO THE SPIN AXIS. THE SECOND SET CONSISTED OF SOLID-STATE SILICON JUNCTION DETECTORS. THESE RESPONDED TO ELECTRONS GREATER THAN 25 AND 140 KEV, ELECTRONS IN THE RANGE 200 TO 770 KEV, AND PROTONS GREATER THAN 200 AND 400 KEV. THE THIRD SET CONSISTED OF FIVE SILICON JUNCTION DETECTORS THAT RESPONDED TO PROTONS BETWEEN 0.15 AND 30 MEV. THE FOURTH SET CONSISTED OF CESIUM IODIDE SCINTILLATION-PHOTOMULTIPLIER SYSTEMS. EACH SYSTEM OPERATED IN TWO MODES AND RESPONDED TO ELECTRONS GREATER THAN 8, 40, AND 60 KEV AND PROTONS GREATER THAN 50 KEV AND IN THE RANGE 50 TO 70 KEV.

----- ISIS 1, SAGALYN-----

INVESTIGATION NAME- SPHERICAL ELECTROSTATIC ANALYZER

NSSDC ID- 69-009A-08

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PARTICLES AND FIELDS
ATMOSPHERIC PHYSICS

PERSONNEL

PI - R.C. SAGALYN
OI - M. SMIDDY

USAF GEOPHYS LAB
USAF GEOPHYS LAB

BRIEF DESCRIPTION

THE OBJECTIVE OF THE SPHERICAL ELECTROSTATIC ANALYZER EXPERIMENT WAS TO MEASURE THE TEMPORAL AND SPATIAL VARIATIONS IN THE CONCENTRATION AND ENERGY DISTRIBUTION OF THE CHARGED PARTICLES THROUGHOUT THE ORBIT. SPECIFICALLY, THE OBJECTIVES WERE TO MEASURE THE FOLLOWING PARAMETERS -- (A) THE DENSITY OF POSITIVE IONS HAVING THERMAL ENERGY IN THE CONCENTRATION RANGE FROM 1.E1 TO 1.E6 IONS PER CUBIC CM, (B) THE KINETIC TEMPERATURE OF THE THERMAL IONS IN THE RANGE FROM 700 TO 4000 K, (C) THE FLUX AND ENERGY SPECTRUM OF PROTONS IN THE RANGE FROM 0 TO 2 KEV, AND (D) THE SATELLITE POTENTIAL WITH RESPECT TO THE UNDISTURBED PLASMA. TWO UNITS MADE UP THE EXPERIMENT PACKAGE -- A 96-CM BOOM THAT SUPPORTED THE SENSOR AND MADE POSSIBLE OMNIDIRECTIONAL MEASUREMENTS, AND AN ELECTRONICS PACKAGE (CONSIDERED TO INCLUDE THE SENSOR) TO PERFORM THE MEASUREMENTS AND TO PROCESS THE DATA INTO A SUITABLE FORM FOR TELEMETRY. THE SENSOR WAS MADE UP OF THREE CONCENTRIC SPHERICAL MESHED GRIDS HAVING RADII OF 3.18, 2.54, AND 1.90 CM. THE INNERMOST GRID WAS THE COLLECTOR. THESE GRIDS WERE MADE FROM TUNGSTEN MESH AND HAD A TRANSPARENCY OF 80 TO 90 PERCENT. TO MEASURE THE PARAMETERS LISTED ABOVE, SUITABLE SWEEP AND STEP VOLTAGES WERE APPLIED TO THE GRIDS. THIS INSTRUMENT WAS OPERATED IN SEVERAL MODES. THE ION DENSITIES WERE SAMPLED 60 TIMES A SECOND, CORRESPONDING TO A SPATIAL RESOLUTION OF 150 M. ONCE PER MIN THE RATIO OF MASS TO TEMPERATURE WAS SAMPLED, AND THE ENERGY DISTRIBUTION WAS SAMPLED ONCE EVERY 2 MIN.

----- ISIS 1, WHITTEKER-----

INVESTIGATION NAME- SWEEP-FREQUENCY SOUNDER

NSSDC ID- 69-009A-01

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - J.H. WHITTEKER	COMMUN RESEARCH CENTRE
O1 - G.E.K. LOCKWOOD	COMMUN RESEARCH CENTRE
O1 - G.L. NELMS	DEFENCE RESEARCH ESTAB
O1 - J.E. JACKSON	NASA-GSFC
O1 - J.W. KING	APPLETON LAB
O1 - J. TURNER	IONOSPHERIC PRED SERV
O1 - M. SYLVAIN	LGE
O1 - O. HOLT	AURORAL OBS
O1 - Y. OGATA	RADIO RESEARCH LAB
O1 - R. RAGHAVARAO	PHYSICAL RESEARCH LAB
O1 - W. CALVERT	U OF COLORADO
O1 - T.E. VAN ZANDT	NOAA-ERL
O1 - L. COLIN	NASA-ARC
O1 - R.B. NORTON	NOAA-ERL
O1 - C.E. PETRIE	COMMUN RESEARCH CENTRE
O1 - K.L. CHAN	NASA-ARC
O1 - R.S. UNWIN	DEPT OF SCI+INDUST RES

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT WAS TO INVESTIGATE THE IONOSPHERIC ELECTRON DENSITY IN THE ALTITUDE RANGE 300 TO 3500 KM FOR A FULL SOLAR CYCLE (BY COMBINING THE ISIS 1 MEASUREMENTS WITH THE ALOUETTE 2 DATA). ANOTHER IMPORTANT FUNCTION OF THE SOUNDER WAS TO PROVIDE CORRELATIVE DATA FOR THE OTHER ISIS 1 EXPERIMENTS, PARTICULARLY THOSE MEASURING IONOSPHERIC PARAMETERS. THE ISIS 1 IONOSONDE WAS A RADIO TRANSMITTER/RECEIVER THAT RECORDED THE TIME DELAY BETWEEN A TRANSMITTED AND A RETURNED RADIO FREQUENCY PULSE. A CONTINUUM OF FREQUENCIES BETWEEN 0.1 AND 20 MHZ WAS SAMPLED ONCE EVERY 19 OR 29 S, AND ONE OF SIX SELECTED FREQUENCIES WAS ALSO SOUNDED FOR A PERIOD OF 3 TO 5 S DURING THIS 19- OR 29-S PERIOD. IN ADDITION TO THE SWEEP- AND FIXED-FREQUENCY MODES OF OPERATION, A MIXED MODE WAS POSSIBLE WHERE THE TRANSMITTER FREQUENCY WAS FIXED AT 0.82 MHZ WHILE THE RECEIVER SWEEPED. SEVERAL VIRTUAL HEIGHT (DELAY TIME) TRACES WERE NORMALLY OBSERVED DUE TO GROUND REFLECTIONS, PLASMA RESONANCES, BIREFRINGENCE OF THE IONOSPHERE, NONVERTICAL PROPAGATION, ETC. VIRTUAL HEIGHT AT A GIVEN FREQUENCY WAS PRIMARILY A FUNCTION OF DISTANCE TRAVERSED BY THE SIGNAL, ELECTRON DENSITY ALONG THE PROPAGATION PATH, AND MODE OF PROPAGATION. THE STANDARD DATA FORMAT WAS AN IONOGRAM SHOWING VIRTUAL HEIGHT AS A FUNCTION OF FREQUENCY.

***** ISIS 2*****

SPACECRAFT COMMON NAME- ISIS 2
ALTERNATE NAMES- ISIS-B, PL-701F
05104

NSSDC ID- 71-024A

LAUNCH DATE- 04/01/71 WEIGHT- 256. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY

CANADA	CRC
UNITED STATES	NASA-OSS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC	EPOCH DATE- 04/02/71
ORBIT PERIOD- 113.6 MIN	INCLINATION- 88.1 DEG
PERIAPSIS- 1358. KM ALT	APOAPSIS- 7428. KM ALT

PERSONNEL

MG - F.W. GAETANO	NASA HEADQUARTERS
SC - E.R. SCHMERLING	NASA HEADQUARTERS
PM - C.A. FRANKLIN	COMMUN RESEARCH CENTRE
PM - L.H. BRACE	NASA-GSFC
PS - L.H. BRACE	NASA-GSFC
PS - G.L. NELMS	DEFENCE RESEARCH ESTAB

BRIEF DESCRIPTION

ISIS 2 WAS AN IONOSPHERIC OBSERVATORY INSTRUMENTED WITH A SWEEP AND A FIXED-FREQUENCY IONOSONDE, A VLF RECEIVER, ENERGETIC AND SOFT PARTICLE DETECTORS, AN ION MASS SPECTROMETER, AN ELECTROSTATIC PROBE, A RETARDING POTENTIAL ANALYZER, A BEACON TRANSMITTER, A COSMIC NOISE EXPERIMENT, AND TWO PHOTOMETERS. THE SOUNDER USED TWO LONG CROSSED-DIPOLE ANTENNAS (73 AND 18.7 M LONG) FOR THE SOUNDING, VLF, AND COSMIC NOISE EXPERIMENTS. THE SPACECRAFT WAS SPIN-STABILIZED TO ABOUT 2 RPM AFTER ANTENNA DEPLOYMENT. THERE WERE TWO BASIC ORIENTATION MODES FOR THE SPACECRAFT, CARTWHEEL AND ORBIT-ALIGNED. THE SPACECRAFT OPERATED APPROXIMATELY THE SAME LENGTH OF TIME IN EACH MODE, REMAINING IN ONE MODE TYPICALLY 3 TO 5 MO. THE CARTWHEEL MODE WITH THE AXIS PERPENDICULAR TO THE ORBIT PLANE WAS MADE AVAILABLE TO PROVIDE RAM AND WAKE DATA FOR SOME EXPERIMENTS FOR EACH SPIN PERIOD, RATHER THAN EACH ORBIT PERIOD. ATTITUDE AND SPIN INFORMATION WAS OBTAINED FROM A THREE-AXIS MAGNETOMETER AND A SUN SENSOR. CONTROL OF ATTITUDE AND SPIN WAS POSSIBLE BY MEANS OF MAGNETIC TORQUING. THE EXPERIMENT PACKAGE ALSO INCLUDED A PROGRAMMABLE TAPE RECORDER WITH A 1-H CAPACITY. FOR NONRECORDED OBSERVATIONS, DATA FROM SATELLITE AND SUBSATELLITE LOCATIONS WERE TELEMETERED WHEN THE SPACECRAFT WAS IN LINE OF SIGHT OF A TELEMETRY STATION. TELEMETRY STATIONS WERE LOCATED SO THAT PRIMARY DATA COVERAGE WAS NEAR THE 80 DEG W MERIDIAN AND NEAR HAWAII, SINGAPORE, AUSTRALIA, ENGLAND, FRANCE, NORWAY, INDIA, JAPAN, ANTARCTICA, NEW ZEALAND, AND CENTRAL AFRICA.

----- ISIS 2, ANGER-----

INVESTIGATION NAME- 3914- AND 5577-A PHOTOMETER

NSSDC ID- 71-024A-11

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
PARTICLES AND FIELDS
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - C.D. ANGER

U OF CALGARY

BRIEF DESCRIPTION

THIS DUAL-WAVELENGTH SCANNING AURORAL PHOTOMETER WAS DESIGNED TO MAP THE DISTRIBUTION OF AURORAL EMISSIONS AT 5577 AND 3914 A OVER THE PORTION OF THE DARK EARTH VISIBLE TO THE SPACECRAFT. A COMBINATION OF INTERNAL ELECTRONIC SCANNING PERFORMED BY AN IMAGE DISSECTOR AND OF THE NATURAL ORBITAL AND ROTATIONAL MOTIONS OF THE SPACECRAFT PERMITTED THE SENSOR TO SYSTEMATICALLY SCAN ACROSS THE EARTH. THE DETECTOR SYSTEM WAS CONSTRUCTED TO ALLOW INCIDENT RADIATION TO BE ACCEPTED FROM TWO DIRECTIONS 180 DEG APART, AND THEN TO FOCUS THIS LIGHT AT A COMMON POINT ON THE SINGLE IMAGE DISSECTOR PHOTOMETER TUBE. ONLY ONE OF THE TWO OPTICAL SYSTEMS POINTED AT THE EARTH AT ANY ONE TIME, WHILE THE OTHER FACED INTO SPACE. WHEN THE SPACECRAFT SPIN AXIS WAS ORIENTED TO LIE IN THE ORBITAL PLANE, EACH ROTATION OF THE SPACECRAFT RESULTED IN AN EARTH SCAN 5 DEG WIDE. THIS WIDTH SIZE WAS CHOSEN TO INSURE OVERLAP WITH THE PREVIOUS SCAN. THE IMAGE DISSECTOR REPETITIVELY SCANNED AT A HIGH SPEED ACROSS THE NARROW DIMENSION OF EACH 5-DEG BAND AND DIVIDED IT INTO SEPARATELY RESOLVED REGIONS 0.4 DEG BY 0.4 DEG. SIMILAR STRIPS WERE SCANNED AT EACH OF THE TWO WAVELENGTHS, BUT AT TIMES THAT DIFFERED BY HALF THE ROTATION PERIOD OF ABOUT 10 S. A CALIBRATION LIGHT SOURCE FOR EACH WAVELENGTH WAS BUILT INTO THE OPTICAL ASSEMBLY, AND A CALIBRATE CYCLE WAS INITIATED AUTOMATICALLY WHENEVER A 'POWER ON' COMMAND WAS GIVEN. TO MINIMIZE THE PROBLEMS ARISING FROM SOLAR ILLUMINATION OF THE OPTICS AND THE DIRECT VIEWING OF THE SUNLIT EARTH, A SUNLIGHT PROTECTION SYSTEM WAS INCLUDED. COMPLETE DETAILS ABOUT THE EXPERIMENT CAN BE FOUND IN THE REPORT 'THE ISIS-2 SCANNING AURORAL PHOTOMETER,' C. D. ANGER, T. FANCOTT, J. McNALLY, AND H. S. KERR, APPLIED OPTICS, 12, 8, 1753-1766, AUGUST 1973.

----- ISIS 2, BARRINGTON-----

INVESTIGATION NAME- VLF RECEIVER

NSSDC ID- 71-024A-03

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - R.E. BARRINGTON	COMMUN RESEARCH CENTRE
O1 - F.H. PALMER	COMMUN RESEARCH CENTRE

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT WAS TO STUDY NATURAL AND MANMADE VLF SIGNALS. SPECIFIC OBJECTIVES INCLUDED THE INVESTIGATION OF VLF PROPAGATION PHENOMENA, ION AND HYBRID PLASMA RESONANCES, AND CORRELATIONS BETWEEN VLF EMISSIONS AND INTENSE FLUXES OF ENERGETIC PARTICLES. IN THIS EXPERIMENT A SWEEP-FREQUENCY EXCITER, COVERING THE RANGE 15 TO 0.05 KHZ IN 1.0 S, WAS USED TO STIMULATE ION-RESONANCES IN THE PLASMA. THE INSTRUMENTATION CONSISTED OF A LOW-FREQUENCY BROADBAND RECEIVER THAT OBSERVED SIGNALS FROM THE 73-M LONG DIPOLE (SPLIT MONOPOLE) ANTENNA BETWEEN 0.05 AND 30 KHZ. THIS SAME ANTENNA WAS USED FOR RECEIVING SIGNALS BELOW 5 MHZ ON THE IONOSONDE. THE VLF RECEIVER HAD A WIDE DYNAMIC RANGE THAT WAS ACHIEVED BY USE OF AN AUTOMATIC GAIN CONTROL SYSTEM. THE EXPERIMENT ALSO PERMITTED ANTENNA IMPEDANCE MEASUREMENTS, WITH OR WITHOUT A DC BIAS ON THE ANTENNA. THE REAL-TIME DATA WERE TRANSMITTED ON 136.08-MHZ TELEMETRY. THE VLF DATA COULD BE RECORDED ON ONE OF THE FOUR TAPE RECORDER CHANNELS WHEN THE SPACECRAFT TAPE RECORDER WAS OPERATING. TAPE RECORDED (AND BACKUP REAL-TIME CAPABILITY) DATA WERE TRANSMITTED ON 400-MHZ TELEMETRY.

----- ISIS 2, CALVERT-----

INVESTIGATION NAME- FIXED-FREQUENCY SOUNDER

NSSDC ID- 71-024A-02

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - W. CALVERT	U OF COLORADO
O1 - R.B. NORTON	NOAA-ERL
O1 - G.L. NELMS	DEFENCE RESEARCH ESTAB
O1 - C.E. PETRIE	COMMUN RESEARCH CENTRE
O1 - G.E.K. LOCKWOOD	COMMUN RESEARCH CENTRE
O1 - J.H. WHITTEKER	COMMUN RESEARCH CENTRE
O1 - J.M. WARNOCK	NOAA
O1 - T.E. VAN ZANDT	NOAA-ERL

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO STUDY IONOSPHERIC FEATURES OF A SMALLER SCALE THAN COULD BE DETECTED BY THE SWEEP SOUNDER AND TO STUDY PLASMA RESONANCES. PARAMETERS MEASURED WERE VIRTUAL RANGE (A FUNCTION OF PROPAGATION TIME OF THE PULSE) AND TIME. THESE DATA WERE NORMALLY OBSERVED ONLY WHEN THE SPACECRAFT WAS IN RANGE OF A TELEMETRY STATION. THE FIXED-FREQUENCY SOUNDER OPERATED FROM THE SAME ANTENNA, TRANSMITTER, AND RECEIVER USED FOR THE SWEEP-FREQUENCY EXPERIMENT. IT NORMALLY OPERATED FOR 3 TO 5 S DURING THE FREQUENCY FLYBACK PERIOD OF THE SWEEP-FREQUENCY OPERATION WHICH WAS EVERY 14 OR 21 S. ONE OF SIX FREQUENCIES (0.12, 0.48, 1.00, 1.95, 4.00, OR 9.303 MHZ) WAS CHOSEN FOR USE BY THE EXPERIMENTER, AS DESIRED. OTHER MODES OF OPERATION WERE AVAILABLE INCLUDING CONTINUOUS OBSERVATION AT A SELECTED FREQUENCY AND A SPECIAL MIXED MODE WITH TRANSMISSION AT A SELECTED ONE OF THE SIX FIXED FREQUENCIES AND SWEEP RECEPTION.

----- ISIS 2, HARTZ-----

INVESTIGATION NAME- COSMIC RADIO NOISE

NSSDC ID- 71-024A-10

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
ASTRONOMY
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - T.R. HARTZ

COMMUN RESEARCH CENTRE

BRIEF DESCRIPTION

THIS EXPERIMENT USED THE SWEEP FREQUENCY IONOSONDE RECEIVER AUTOMATIC GAIN CONTROL (AGC) VOLTAGES TO MEASURE GALACTIC AND SOLAR RADIO NOISE LEVELS. THE RECEIVER SWEEPED FROM 0.1 TO 20 MHZ. THE DYNAMIC RANGE WAS 50 DB, AND THE BANDWIDTH WAS 55 KHZ. THE ANTENNAS USED WERE 18.7-M AND 73-M DIPOLES.

----- ISIS 2, HOFFMAN-----

INVESTIGATION NAME- ION-MASS SPECTROMETER

NSSDC ID- 71-024A-06

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - J.H. HOFFMAN

U OF TEXAS, DALLAS

BRIEF DESCRIPTION

THIS MAGNETIC ION-MASS SPECTROMETER EXPERIMENT WAS FLOWN TO MEASURE THE DISTRIBUTION OF THE CONCENTRATIONS OF THE POSITIVE ION SPECIES AS A FUNCTION OF TIME AND POSITION, WITH PARTICULAR INTEREST FOCUSED ON THE POLAR WIND PARTICLES. THE INSTRUMENT HAD TWO ION DETECTOR SYSTEMS, AND MASS SCANNING THROUGH THE RANGE FROM 1 TO 64 AMU WAS ACCOMPLISHED IN TWO SECTIONS -- 1 TO 8 U AND 8 TO 64 U. TWO ION BEAMS EMERGED FROM THE MAGNETIC SECTOR OF THE INSTRUMENT AND WERE SIMULTANEOUSLY DETECTED BY ELECTRON MULTIPLIERS AND LOG ELECTROMETER AMPLIFIERS. A CIRCUIT FOLLOWING EACH AMPLIFIER DETECTED THE PEAK AMPLITUDE OF THE ION CURRENT. THIS PEAK VALUE, RATHER THAN THE ENTIRE MASS SPECTRUM, WAS TRANSMITTED IN ORDER TO REDUCE THE REQUIRED TELEMETRY BANDWIDTH. IN THIS MODE OF OPERATION, THE COMPLETE MASS RANGE WAS SCANNED IN 1 S. A BACKUP MODE WAS PROVIDED THAT PRODUCED AN ANALOG OUTPUT WITH A SWEEP PERIOD OF 8 S. THIS EXPERIMENT OPERATED NOMINALLY AFTER LAUNCH WITH MOST OF THE DATA OBTAINED IN THE PEAK MODE AND WHILE THE SATELLITE OPERATED IN THE CARTWHEEL MODE. FOR ABOUT 2 MIN PER PASS OVER OTTAWA, CANADA, THE EXPERIMENT OPERATED IN THE ANALOG MODE. IN-FLIGHT CALIBRATION WAS ACHIEVED BY COMPARING ION CONCENTRATION MEASUREMENTS AT APPROPRIATE ALTITUDES, I.E., WHERE A SINGLE ION SPECIES PREDOMINATED, WITH ELECTRON DENSITY DATA FROM THE SOUNDER ON BOARD. OTHER COMPARISONS WERE MADE BETWEEN THE SPECTROMETER OUTPUT AND MEASUREMENTS OBTAINED FROM OTHER RELATED EXPERIMENTS ON BOARD.

----- ISIS 2, MAIER-----

INVESTIGATION NAME- RETARDING POTENTIAL ANALYZER

NSSDC ID- 71-024A-08

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL

PI - E.J. MAIER
OI - B.E. TROY, JR.
OI - J.L. DONLEYNASA-GSFC
US NAVAL RESEARCH LAB
NASA-GSFC

BRIEF DESCRIPTION

THE PRIMARY OBJECTIVE OF THIS EXPERIMENT WAS TO MEASURE THE POSITIVE ION DENSITY, COMPOSITION, AND TEMPERATURE IN VICINITY OF THE SPACECRAFT. A SECONDARY OBJECTIVE WAS TO MEASURE THE THERMAL ELECTRON DENSITY AND TEMPERATURE, AND THE FLUX OF SUPRATHERMAL ELECTRONS. THIS RETARDING POTENTIAL ANALYZER CONSISTED OF THREE GRIDS (APERTURE GRID, RETARDING GRID AND A SUPPRESSOR GRID) THAT PROVIDED A VOLT-AMPERE CURVE RELATING SWEEP VOLTAGE ON THE RETARDING GRID TO CURRENT FLOW TO THE COLLECTOR. ANALYSIS OF THE VOLT-AMPERE CURVES PROVIDE ION/ELECTRON TEMPERATURES AND DENSITIES. THIS EXPERIMENT WAS DESIGNED TO OPERATE ONLY WITH THE SATELLITE IN A CARTWHEEL MODE OF OPERATION. IN THIS MODE, THE SPIN AXIS IS PERPENDICULAR TO THE ORBIT PLANE. THIS ALLOWS THE ANALYZER APERTURE TO FACE THE DIRECTION OF SATELLITE MOTION ONCE EACH SPIN PERIOD.

----- ISIS 2, MCDIARMID-----

INVESTIGATION NAME- ENERGETIC PARTICLE DETECTORS

NSSDC ID- 71-024A-04

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
IONOSPHERES
PARTICLES AND FIELDS

PERSONNEL

PI - I.B. MCDIARMID
OI - J.R. BURROWSNATL RES COUNC OF CAN
NATL RES COUNC OF CAN

BRIEF DESCRIPTION

THE OBJECTIVES OF THE ENERGETIC PARTICLE EXPERIMENT WERE TO PROVIDE DATA THAT WOULD AID IN THE UNDERSTANDING OF: (1) THE MECHANISMS RESPONSIBLE FOR THE PRODUCTION AND CONTROL OF THE OUTER RADIATION ZONE; (2) THE RELATED PROBLEM OF SOLAR-FLARE PARTICLE ENTRY INTO THE EARTH'S MAGNETIC FIELD; AND (3) INTERACTIONS BETWEEN THE EARTH'S MAGNETOSPHERE AND THE SOLAR WIND. THIS EXPERIMENT CONSISTED OF FOUR SETS OF DETECTORS. THE FIRST SET CONSISTED OF THREE GEIGER COUNTERS (OF WHICH ONE FAILED AFTER LAUNCH) AND MEASURED ELECTRONS GREATER THAN 20 AND 40 KEV PERPENDICULAR AND PARALLEL TO THE SPIN AXIS. THESE GEIGER COUNTERS WERE ALSO SENSITIVE TO PROTONS WITH ENERGIES GREATER THAN 240 AND 600 KEV, RESPECTIVELY. ALL REMAINING DETECTORS MEASURED PARTICLES PERPENDICULAR TO THE SPIN AXIS. THE SECOND SET CONSISTED OF TWO SOLID-STATE SILICON JUNCTION DETECTORS. BOTH DETECTORS WERE OPERATED IN LOW- AND HIGH-THRESHOLD MODE, WHILE ONE COULD ADDITIONALLY BE SWITCHED TO ANOTHER DISCRIMINATION LEVEL. THEY MEASURED ELECTRONS WITH ENERGIES GREATER THAN 40, 60, 90, 120, 150, AND 200 KEV. THEY WERE ALSO SENSITIVE TO PROTONS WITH ENERGIES GREATER THAN 150, 200, AND 750 KEV. THE SWITCHABLE DETECTOR EXPERIENCED CONTINUOUS SATURATION. THE THIRD SET CONSISTED OF THREE SILICON JUNCTION DETECTORS THAT MEASURED PROTONS IN THE ENERGY RANGES 0.8 TO 4.0, 3.2 TO 12.7, AND 12.9 TO 28.0 MEV. ALPHA PARTICLES IN THE ENERGY RANGE 2.5 TO 16.0 MEV, AND ELECTRONS IN THE ENERGY RANGE 1.0 TO 2.0 MEV. THE FOURTH SET WAS COMPOSED OF TWO CESIUM IODIDE SCINTILLATION-PHOTOMULTIPLIER SYSTEMS (CHANNELTRONS WITH CYLINDRICAL ELECTROSTATIC ANALYZERS) STEPPED THROUGH EIGHT ENERGIES IN 64/60 OF A SECOND. THESE DIFFERENTIAL SPECTROMETERS MEASURED ELECTRONS AT 9.6, 7.8, 6.0, 4.1, 3.0, 2.2, 1.3, AND 0.15 KEV, AND MEASURED PROTONS AT 26.2, 21.6, 17.0, 12.4, 9.4, 7.6, 5.2, AND 2.2 KEV.

----- ISIS 2, SHEPHERD-----

INVESTIGATION NAME- 6300-A PHOTOMETER

NSSDC ID- 71-024A-12

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - G.G. SHEPHERD

YORK U

BRIEF DESCRIPTION

A TWO-CHANNEL PHOTOMETER WAS USED TO MEASURE DIRECTLY AND TO MAP THE INTENSITY OF THE ATOMIC OXYGEN RED LINE AT 6300 A IN DAY, TWILIGHT, AND NIGHT AIRGLOW AND AURORA. EACH CHANNEL HAD ITS OWN OPTICAL INPUT, AND THE TWO INPUTS WERE MOUNTED AT THE SAME END OF THE SPACECRAFT, SEPARATED BY 180 DEG, WITH THEIR AXES AT 90 DEG TO THE SPACECRAFT'S SPIN AXIS. ONE OPTICAL INPUT WAS CHARACTERIZED BY A SPECTRAL BANDWIDTH OF 12 A CENTERED AROUND THE 6300-A LINE OF ATOMIC OXYGEN, AND THE OTHER INPUT WAS USED FOR WHITE LIGHT MEASUREMENTS. THE SPINNING SATELLITE CAUSED THE PHOTOMETER TO ALTERNATELY VIEW THE EARTH AND THEN THE SKY, I.E., WHEN ONE SENSOR VIEWED THE EARTH, THE OTHER SENSOR SAW THE SKY. BOTH SENSORS HAD A 2.5-DEG CIRCULAR FIELD OF VIEW. WITH THE USE OF A BEAM-COMBINER ARRANGEMENT, THE SAME PHOTOMULTIPLIER ACCEPTED THE TWO INPUTS. THE DYNAMIC RANGE OF INTENSITY MEASUREMENTS WAS FROM ABOUT 1.E11 PHOTONS PER SQ M PER SEC (10 RAYLEIGHS) TO MORE THAN 1.E16 PHOTONS PER SQ M PER SEC. SUNLIGHT COULD ENTER THE OPTICAL SYSTEMS DIRECTLY IN ADDITION TO EARTH-REFLECTED LIGHT. THE INSTRUMENT BAFFLE WAS ILLUMINATED BY THE SUN ONLY FOR THE OFF-AXIS ANGLES LESS THAN 47 DEG. OUTSIDE THIS LIMIT, THE DATA WERE NOT DEGRADED BY SUNLIGHT, PERMITTING NORMAL OPERATION IN THE REGION OF THE ORBIT WHERE THE SPACECRAFT WAS IN SUNLIGHT, BUT THE PORTION OF THE EARTH BENEATH IT WAS DARK. AN EXTERNAL LIGHT SOURCE 'SAW' THE FILTER ONLY WHEN IT WAS 7.5 DEG OR LESS OFF AXIS. IN THE

RANGE 7.5 TO 47 DEG, GOOD DATA WERE STILL OBTAINED WHEN THE SUNLIT EARTH WAS THE ORIGIN OF THE CONTAMINATION. TO PERFORM THE DATA ANALYSIS, IT WAS NECESSARY, AMONG OTHER OPERATIONS, TO EVALUATE DIFFERENT GEOMETRICAL SITUATIONS, AND TO LOCATE THE ON-EARTH LIMB CROSSING OF THE 12-A BANDPASS PHOTOMETER SO THAT THE DATA COULD BE ORGANIZED INTO SPIN MAPS. FOR MORE DETAILS SEE, 'ISIS-2 ATOMIC OXYGEN RED LINE PHOTOMETER,' G.G. SHEPHERD, ET AL, 'APPLIED OPTICS,' 12, 8, 1767-1774, AUGUST 1973.

----- ISIS 2, WHITEKER -----

INVESTIGATION NAME- SWEEP-FREQUENCY SOUNDER

NSSDC ID- 71-024A-01

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - J.H. WHITEKER	COMMUN RESEARCH CENTRE
OI - G.E.K. LOCKWOOD	COMMUN RESEARCH CENTRE
OI - G.L. NELMS	DEFENCE RESEARCH ESTAB
OI - J. TURNER	IONOSPHERIC PRED SERV
OI - M. SYLVAIN	LGE
OI - O. HOLT	AURORAL OBS
OI - Y. OGATA	RADIO RESEARCH LAB
OI - R. RAGHAVARAO	PHYSICAL RESEARCH LAB
OI - J.E. JACKSON	NASA-GSFC
OI - C.E. PETRIE	COMMUN RESEARCH CENTRE
OI - T.E. VAN ZANDT	NOAA-ERL
OI - L. COLIN	NASA-ARC
OI - W. CALVERT	U OF COLORADO
OI - R.B. NORTON	NOAA-ERL
OI - J.W. KING	APPLETON LAB
OI - K.L. CH	NASA-ARC
OI - R.S. UNWIN	DEPT OF SCI+INDUST RES

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT WAS TO MEASURE THE IONOSPHERIC ELECTRON DENSITY IN THE ALTITUDE RANGE 300 TO 1400 KM. ANOTHER IMPORTANT FUNCTION OF THE SOUNDER WAS TO PROVIDE CORRELATIVE DATA FOR THE OTHER ISIS 2 EXPERIMENTS, PARTICULARLY THOSE MEASURING IONOSPHERIC PARAMETERS. THE ISIS 2 IONOSONDE WAS A RADIO TRANSMITTER THAT RECORDED THE TIME DELAY BETWEEN A TRANSMITTED AND RETURNED RADIO FREQUENCY PULSE. A CONTINUUM OF FREQUENCIES BETWEEN 0.1 AND 20 MHZ WAS SAMPLED EVERY 14 OR 21 S, AND ONE OF SIX SELECTED FREQUENCIES WAS ALSO USED FOR SOUNDING FOR A FEW SECONDS DURING EACH 14- OR 21-S PERIOD. IN ADDITION TO THE SWEEP- AND FIXED-FREQUENCY MODES OF OPERATION, A MIXED MODE WAS AVAILABLE IN WHICH THE TRANSMITTER FREQUENCY WAS FIXED AT ONE OF SIX POSSIBLE FREQUENCIES WHILE THE RECEIVER SWEEP. SEVERAL VIRTUAL RANGE (DELAY TIME) TRACES RESULTING FROM GROUND REFLECTIONS, PLASMA RESONANCES, BIREFRINGENCE OF THE IONOSPHERE, NONVERTICAL PROPAGATION, ETC., WERE NORMALLY OBSERVED. VIRTUAL RANGE AT A GIVEN FREQUENCY WAS PRIMARILY A FUNCTION OF DISTANCE TRAVERSED BY THE SIGNAL, ELECTRON DENSITY ALONG THE PROPAGATION PATH, AND MODE OF PROPAGATION. THE STANDARD DATA FORMAT WAS AN IONOGRAM (GRAPH) SHOWING VIRTUAL RANGE AS A FUNCTION OF RADIO FREQUENCY.

***** ISS-B*****

SPACECRAFT COMMON NAME- ISS-B

ALTERNATE NAMES- IONOSP SOUNDING SAT 2, 10674
UME 2, ISS-2

NSSDC ID- 78-018A

LAUNCH DATE- 02/14/78
LAUNCH SITE- TANEGASHIMA, JAPAN
LAUNCH VEHICLE- NU

WEIGHT- 135. KG

SPONSORING COUNTRY/AGENCY
JAPAN RRL

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC	EPOCH DATE- 02/17/78
ORBIT PERIOD- 107. MIN	INCLINATION- 69.4 DEG
PERIAPSIS- 972. KM ALT	APOAISIS- 1225. KM ALT

PERSONNEL

PM - N. WAKAI	RADIO RESEARCH LAB
PS - N. MATUURA	RADIO RESEARCH LAB

BRIEF DESCRIPTION

THE IONOSPHERE SOUNDING SATELLITE (ISS) WAS PART OF JAPAN'S CONTRIBUTION TO THE INTERNATIONAL MAGNETOSPHERIC STUDY (IMS). ITS OBJECTIVES WERE TO ACCUMULATE DATA FOR STUDY OF THE TOPSIDE IONOSPHERE AND TO SURVEY RADIO NOISE AT FOUR FREQUENCIES, FROM BOTH EARTH AND COSMIC SOURCES. IT PREPARED WORLD-WIDE MAPS OF F2 CRITICAL FREQUENCY FROM THE IONOSPHERE SOUNDING DATA. THE ISS 2 WAS A SMALL OBSERVATORY WITH FOUR EXPERIMENTS ON BOARD. THE SPACECRAFT, A RIGHT CYLINDER, 82 CM LONG AND 93.5 CM IN DIAMETER, WAS SPIN STABILIZED AT ABOUT 10 RPM WITH THE SPIN AXIS NORMAL TO THE ECLIPTIC PLANE. TWO PAIRS OF CROSSED DIPOLE ANTENNAE EXTENDED FROM THE CENTRAL PART OF THE SATELLITE AND LAY PERPENDICULAR TO THE SPIN AXIS. THESE ANTENNAE, 36.8 AND 11.4 M LONG, WERE UNFURLED IN ORBIT AND WERE SHARED BY IONOSPHERIC SOUNDING AND RADIO NOISE EXPERIMENTS. A SPHERICAL RETARDING POTENTIAL TRAP SENSOR WAS MOUNTED ON A BOOM PERPENDICULAR TO THE SPIN AXIS. A MAGNETIC ATTITUDE SENSOR WAS MOUNTED ON A SIMILAR BOOM ON THE OPPOSITE SIDE OF THE

SPACECRAFT. THE REMAINING EXPERIMENT INVOLVED A BENNETT-TYPE MASS SPECTROMETER WITH TWO SENSORS FLUSH MOUNTED ON OPPOSITE ENDS OF THE SPACECRAFT. SPACECRAFT ATTITUDE WAS DETERMINED BY MEANS OF A MAGNETOMETER, A SOLAR SENSOR, AND AN EARTH HORIZON SENSOR. SMALL TELEMETRY AND COMMAND ANTENNAS EXTENDED FROM THE SPACECRAFT. THE SPACECRAFT WAS POWERED FROM A BATTERY SOLAR-CELL SYSTEM WITH SOLAR CELLS COVERING MOST OF THE CYLINDRICAL SURFACE. ONE RECORDER ON BOARD PERMITTED SPACECRAFT OPERATION IN EITHER A RECORDED (FOR UP TO 112 MIN) OR REAL-TIME MODE. READOUT AND REAL-TIME OPERATION WAS DONE FROM KAGOSHIMA, JAPAN, AND SYOWA STATION, ANTARCTICA.

----- ISS-B, IWAMOTO -----

INVESTIGATION NAME- ION MASS SPECTROMETER

NSSDC ID- 78-018A-04

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PARTICLES AND FIELDS

PERSONNEL

PI - I. IWAMOTO	RADIO RESEARCH LAB
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BRIEF DESCRIPTION

THIS EXPERIMENT WAS FLOWN TO MEASURE THE POSITIVE ION COMPOSITION OVER THE SPACECRAFT ORBIT. TWO BENNETT-TYPE ION MASS SPECTROMETERS WERE FLUSH MOUNTED ON OPPOSITE ENDS OF THE SPACECRAFT TO LOOK IN OPPOSITE DIRECTIONS ALONG THE SPIN AXIS. THE INSIDE DIAMETER OF THESE CYLINDRICAL SENSORS IS 36 MM. THE MASS RANGE COVERED WAS 1 TO 20 U, AND THE ION CONCENTRATIONS WERE MEASURED OVER THE RANGE FROM 1 TO 1.E4 IONS PER CC.

----- ISS-B, KOTAKI -----

INVESTIGATION NAME- RADIO NOISE NEAR 2.5, 5, 10, AND 25 MHZ

NSSDC ID- 78-018A-02

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - M. KOTAKI	RADIO RESEARCH LAB
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BRIEF DESCRIPTION

THE OBJECTIVES OF THIS EXPERIMENT WERE TO OBSERVE AND STUDY -- (1) THE GLOBAL DISTRIBUTION OF SPHERICS AND (2) THE TIME VARIATION OF SPHERICS AND COSMIC NOISE. RADIO NOISE IN THE FREQUENCY CHANNELS -- 2.497, 4.997, 9.997, 10.003, 24.996, AND 25.006 MHZ -- WERE OBSERVED. CHARACTERISTICS TO BE OBSERVED AT EACH FREQUENCY WERE NOISE INTENSITY (RESOLUTION OF 1/12.8 S) AND OCCURRENCE FREQUENCY OF IMPULSIVE NOISE (.GT. 15 DB ABOVE RESOLVED INTENSITY).

----- ISS-B, MATUURA -----

INVESTIGATION NAME- SWEEP FREQUENCY TOPSIDE IONOSPHERIC SOUNDER (TOP)

NSSDC ID- 78-018A-01

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES

PERSONNEL

PI - N. MATUURA	RADIO RESEARCH LAB
PI - R. MAEDA	RADIO RESEARCH LAB
OI - Y. TAKENOSHITA	RADIO RESEARCH LAB

BRIEF DESCRIPTION

THE IONOSPHERE SOUNDING SATELLITE (ISS) IONOSONDE WAS A PULSED RADIO TRANSMITTER AND RECEIVER THAT RECORDED THE TIME DELAY BETWEEN A TRANSMITTED PULSE AND ITS RETURN. FREQUENCIES BETWEEN 0.5 AND 14.8 MHZ WERE SAMPLED IN 0.1-MHZ STEPS TO PROVIDE VIRTUAL RANGE (DELAY TIME) OF SIGNAL REFLECTIONS. MORE THAN ONE VIRTUAL RANGE VS FREQUENCY TRACE WAS OFTEN OBSERVED. THESE RESULTED FROM GROUND REFLECTIONS, PLASMA RESONANCES, BIREFRINGENCE OF THE IONOSPHERE, NONVERTICAL PROPAGATION, ETC. VIRTUAL RANGE AT A GIVEN FREQUENCY WAS PRIMARILY A FUNCTION OF DISTANCE TRAVERSED BY THE SIGNAL, ELECTRON DENSITY ALONG THE PROPAGATION PATH, AND MODE OF PROPAGATION. THE STANDARD DATA FORM, AN IONOGRAM (GRAPH) SHOWING VIRTUAL RANGE AS A FUNCTION OF RADIO PULSE FREQUENCY, WAS USED TO DISPLAY THESE OBSERVATIONS. TWO OTHER FORMS OF DATA WERE PREPARED FROM THESE IONOGRAMS. THEY WERE DIGITAL (FREQUENCY OF VIRTUAL RANGE) VALUES OF CHARACTERISTIC IONOSPHERIC FEATURES READ DIRECTLY FROM THE IONOGRAM AND COMPUTED PROFILES OF ELECTRON DENSITY. THIS SOUNDING MODE OF OPERATION, CALLED TOP-B, REQUIRED 16 S TO SAMPLE ALL FREQUENCIES (ONE IONOGRAM). A TOP-A MODE WAS ALSO AVAILABLE. IN THE TOP-A MODE, AN ITERATIVE LOGIC WAS EMPLOYED WITH THE PULSED TRANSMISSION TO DETERMINE THE F2 REGION CRITICAL FREQUENCY, ITS CORRESPONDING VIRTUAL HEIGHT, AND OTHER RELATED SUPPORTING DATA. WITH DATA FROM THE TOP-A MODE, WORLD-WIDE MAPS OF CRITICAL FREQUENCY WERE PREPARED. FOR BOTH THE TOP-A AND TOP-B MODES, THE COMPLETE CYCLE TIME BETWEEN SUCCESSIVE IONOGRAMS OR SUCCESSIVE CRITICAL FREQUENCY OBSERVATIONS WAS 64 S.

----- ISS-B, MORI-----

INVESTIGATION NAME- RETARDING POTENTIAL TRAP

NSSDC ID- 78-018A-03 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PARTICLES AND FIELDS

PERSONNEL
PI - H. MORI RADIO RESEARCH LAB

BRIEF DESCRIPTION
THIS PROBE WAS A SPHERICAL RETARDING POTENTIAL TRAP DESIGNED TO OBSERVE AMBIENT ION AND ELECTRON DENSITIES RANGING FROM 10^{-3} TO 10^{-6} PER CC. AMBIENT ION AND ELECTRON TEMPERATURES IN THE RANGE 500 TO 5000-DEG K WERE DETERMINED. AS WITH ALL RETARDING POTENTIAL INSTRUMENTS, THESE PARAMETERS ARE DERIVED FROM INTERPRETATION OF THE CURRENT FLOW MEASUREMENT WITH A GIVEN VOLTAGE SEQUENCE APPLIED TO THE COLLECTOR AND SCREEN GRIDS. THE SENSOR WAS MOUNTED ON A BOOM EXTENDING PERPENDICULAR TO THE SPACECRAFT SPIN AXIS. IT CONSISTED OF A 2 CM DIAMETER COLLECTOR, CONCENTRICALLY ENVELOPED BY 6- AND 10-CM DIAMETER SPHERICAL WIRE GRIDS. THE CURRENT VOLTAGE ANALOG DATA WERE TELEMETERED AND SUBSEQUENTLY ANALYZED BY THE EXPERIMENTER.

***** IUE*****

SPACECRAFT COMMON NAME- IUE
ALTERNATE NAMES- INT ULTRAVIOLET EXPL, SAS-D
10637

NSSDC ID- 78-012A

LAUNCH DATE- 01/26/78 WEIGHT- 669. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS
INTERNATIONAL ESA
UNITED KINGDOM SRC

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 01/27/78
ORBIT PERIOD- 1435.7 MIN INCLINATION- 28.6 DEG
PERIAPSIS- 25669. KM ALT APOAPSIS- 45887. KM ALT

PERSONNEL
MG - M.J. AUCREMANNE NASA HEADQUARTERS
SC - N.G. ROMAN NASA HEADQUARTERS
PM - J.P. CORRIGAN NASA-GSFC
PS - A. BOGGESE, 3RD NASA-GSFC

BRIEF DESCRIPTION
THE INTERNATIONAL ULTRAVIOLET EXPLORER (IUE, FORMERLY SAS-D) SATELLITE WAS A SPACEBORNE ULTRAVIOLET ASTRONOMICAL OBSERVATORY FOR USE AS AN INTERNATIONAL FACILITY. THE IUE CONTAINED A 45-CM TELESCOPE SOLELY FOR SPECTROSCOPY IN THE WAVELENGTH RANGE OF 1100 TO 3300 Å. THE SATELLITE AND OPTICAL INSTRUMENTATION WERE PROVIDED BY THE GODDARD SPACE FLIGHT CENTER (GSFC). THE TELEVISION CAMERAS USED AS DETECTORS WERE PROVIDED BY THE UNITED KINGDOM SPACE RESEARCH COUNCIL (UKSRC). THE EUROPEAN SPACE AGENCY (ESA, FORMERLY ESRO) SUPPLIED SOLAR PADDLES FOR THE SATELLITE AND A EUROPEAN CONTROL CENTER. AFTER LAUNCH, TWO-THIRDS OF THE OBSERVING TIME WAS DIRECTED FROM A CONTROL CENTER AT GSFC, AND ONE-THIRD OF THE TIME THE SATELLITE WAS OPERATED FROM THE EUROPEAN CONTROL CENTER NEAR MADRID. THE IUE OBSERVATORY WAS IN A SYNCHRONOUS ORBIT. THE 45-CM RITCHIEY-CRETEN F/15 TELESCOPE FED A SPECTROGRAPH PACKAGE. THE SPECTROGRAPH PACKAGE, USING SEC VIDICON CAMERAS AS DETECTORS, COVERED THE SPECTRAL RANGE FROM 1100 TO 3300 Å. IT OPERATED IN EITHER A HIGH- OR LOW-RESOLUTION MODE, WITH RESOLUTIONS OF APPROXIMATELY 0.2 AND 6 Å, RESPECTIVELY. THE SEC VIDICONS COULD INTEGRATE THE SIGNAL FOR UP TO 1 H. THIS INTEGRATION TIME LIMITED DETECTION IN THE HIGH- AND LOW-RESOLUTION MODES TO APPROXIMATELY 5 AND 0.03 PHOTONS/(SQ CM-S-ANGSTROM), RESPECTIVELY, FOR A SIGNAL-TO-NOISE RATIO OF 50. LISTINGS OF GUEST OBSERVERS AND THEIR INVESTIGATIONS CAN BE OBTAINED FROM THE IUE NEWSLETTER. THIS NEWSLETTER IS AVAILABLE FROM: IUE OBSERVATORY, CODE 685, GODDARD SPACE FLIGHT CENTER, GREENBELT, MD, 20771 U.S.A.

----- IUE, GUEST INVESTIGATORS-----

INVESTIGATION NAME- LOW-/HIGH-RESOLUTION, ULTRAVIOLET
SPECTROGRAPH PACKAGE

NSSDC ID- 78-012A-01 INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - GUEST INVESTIGATORS SEE EXPR. DESCRIPT.

BRIEF DESCRIPTION
THIS EXPERIMENT INCLUDED THE ULTRAVIOLET SPECTROGRAPH PACKAGE CARRIED BY THE IUE, CONSISTING OF TWO PHYSICALLY DISTINCT ECHELLE-SPECTROGRAPH/CAMERA UNITS CAPABLE OF ASTRONOMICAL OBSERVATIONS. EACH SPECTROGRAPH WAS A THREE-ELEMENT ECHELLE SYSTEM, COMPOSED OF AN OFF-AXIS PARABOLOIDAL COLLIMATOR, AN ECHELLE GRATING, AND A SPHERICAL FIRST-ORDER GRATING THAT WAS USED TO SEPARATE THE ECHELLE ORDERS AND FOCUS THE SPECTRAL DISPLAY ON AN IMAGE CONVERTER-PLUS-SEC VIDICON CAMERA. FOR EACH UNIT THERE WAS A SPARE CAMERA. THE CAMERA UNITS WERE ABLE TO INTEGRATE THE SIGNAL. THE READOUT/PREPARATION CYCLE FOR THE CAMERAS TOOK APPROXIMATELY 4 MIN. WAVELENGTH CALIBRATION WAS PROVIDED BY THE USE OF A HOLLOW CATHODE COMPARISON LAMP. THE PHOTOMETRIC CALIBRATION WAS ACCOMPLISHED BY OBSERVING STANDARD STARS WHOSE SPECTRAL FLUXES HAVE BEEN PREVIOUSLY CALIBRATED BY OTHER MEANS. BOTH ECHELLE-SPECTROGRAPH-CAMERA UNITS WERE CAPABLE OF HIGH-RESOLUTION (0.2 Å) OR LOW-RESOLUTION (6Å) PERFORMANCE. THE DUAL HIGH/LOW RESOLUTION CAPABILITY WAS IMPLEMENTED BY THE INSERTION OF A FLAT IN FRONT OF THE ECHELLE GRATING, SO THAT THE ONLY DISPERSION WAS PROVIDED BY THE SPHERICAL GRATING. AS THE SEC VIDICONS COULD INTEGRATE THE SIGNAL FOR UP TO 1 H, DATA WITH A SIGNAL-TO-NOISE RATIO OF 50 COULD BE OBTAINED FOR A 80 STAR OF THE 9TH AND 14TH MAGNITUDE IN THE HIGH- AND LOW-RESOLUTION MODES, RESPECTIVELY. THE DISTINGUISHING CHARACTERISTICS OF THE UNITS WERE THEIR WAVELENGTH COVERAGE. ONE UNIT COVERED THE WAVELENGTH RANGE FROM 1192 TO 1924 Å IN THE HIGH-RESOLUTION MODE, AND 1135 TO 2085 Å IN THE LOW-RESOLUTION MODE. FOR THE OTHER UNIT, THE RANGES WERE FROM 1893 TO 3031 Å AND 1800 TO 3255 Å FOR THE HIGH- AND LOW-RESOLUTION MODES, RESPECTIVELY. EACH UNIT ALSO HAD ITS OWN CHOICE OF ENTRANCE APERTURES EITHER FOR A 3-ARC S HOLE OR A 10-BY 20-ARC S SLOT. THE 10- BY 20-ARC S SLOTS COULD BE BLOCKED BY A COMMON SHUTTER, BUT THE 3-ARC S APERTURE WAS ALWAYS OPEN. AS A RESULT, TWO APERTURE CONFIGURATIONS WERE POSSIBLE -- (1) BOTH 3-ARC S APERTURES OPEN AND BOTH 10- BY 20-ARC S SLOTS CLOSED, OR (2) ALL FOUR APERTURES OPEN. WITH THIS INSTRUMENTATION, THE OBSERVATIONAL OPTIONS OPEN TO AN OBSERVER WERE LONG-WAVELENGTH AND/OR SHORT-WAVELENGTH SPECTROGRAPH, HIGH OR LOW RESOLUTION, AND LARGE OR SMALL APERTURES. EXPOSURES COULD BE MADE WITH THE TWO SPECTROGRAPHS SIMULTANEOUSLY, BUT REMEMBERING THAT THE ENTRANCE APERTURES FOR EACH WERE DISTINCT AND SEPARATED IN THE SKY BY ABOUT 1 ARC MIN. AN ADDITIONAL RESTRICTION WAS THAT DATA COULD BE READ OUT FROM ONLY ONE CAMERA AT A TIME. HOWEVER, ONE CAMERA COULD BE EXPOSING WHILE THE OTHER CAMERA WAS BEING READ OUT. THE CHOICE OF HIGH OR LOW RESOLUTION COULD BE MADE INDEPENDENTLY FOR THE TWO SPECTROGRAPHS SO THAT THE OPERATIONAL MODES OF THE UNITS NEED NOT HAVE BEEN THE SAME. LISTINGS OF GUEST OBSERVERS AND THEIR INVESTIGATIONS CAN BE OBTAINED FROM THE IUE NEWSLETTER. THIS NEWSLETTER IS AVAILABLE FROM: IUE OBSERVATORY, CODE 685, GODDARD SPACE FLIGHT CENTER, GREENBELT, MARYLAND, 20771, U.S.A.

----- IUE, NONE ASSIGNED-----

INVESTIGATION NAME- PARTICLE FLUX MONITOR (SPACECRAFT)

NSSDC ID- 78-012A-02 INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - NONE ASSIGNED

BRIEF DESCRIPTION
THE PARTICLE FLUX MONITOR EXPERIMENT WAS PLACED IN IUE TO MONITOR THE TRAPPED ELECTRON FLUXES THAT AFFECT THE SENSITIVITY OF THE ULTRAVIOLET SENSOR IN THE IUE SPECTROGRAPH PACKAGE EXPERIMENT, NSSDC ID 78-012A-01. THE PARTICLE FLUX MONITOR WAS A LITHIUM-DRIFTED SILICON DETECTOR WITH A HALF-ANGLE CONICAL FIELD OF VIEW OF 16 DEG. IT HAD AN ALUMINUM ABSORBER OF 0.357 G/SQ CM IN FRONT OF THE COLLIMATOR AND A BRASS SHIELDING HAVING A MINIMUM THICKNESS OF 2.31 G/SQ CM. THE EFFECTIVE ENERGY THRESHOLD FOR ELECTRON MEASUREMENTS WAS 1.3 MEV. THE EXPERIMENT WAS ALSO SENSITIVE TO PROTONS WITH ENERGIES GREATER THAN 15 MEV. DATA CAN BE PROVIDED TO INTERESTED PERSONS IN THE FORM OF DAILY STRIP CHARTS BY THE IUECC. THE INSTRUMENT WAS USED AS AN OPERATIONAL TOOL TO AID IN DETERMINING BACKGROUND RADIATION AND ACCEPTABLE CAMERA EXPOSURE TIME. IT WAS PROVIDED BY DR. C. BOSTROM OF THE APPLIED PHYSICS LABORATORY.

***** JIKIKEN*****

SPACECRAFT COMMON NAME- JIKIKEN
ALTERNATE NAMES- EXOSPHERIC SAT. B, EXOS-B
11027

NSSDC ID- 78-087A

LAUNCH DATE- 09/16/78 WEIGHT- 92. KG
LAUNCH SITE- KAGOSHIMA, JAPAN
LAUNCH VEHICLE- M-3H

ORIGINAL PAGE IS
OF POOR QUALITY

SPONSORING COUNTRY/AGENCY
JAPAN

ISAS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 533. MIN
PERIAPSIS- 230. KM ALT

EPOCH DATE- 09/16/78
INCLINATION- 31. DEG
APOAPSIS- 30558. KM ALT

PERSONNEL

PM - T.	OBAYASHI	U OF TOKYO
PS - N.	KAWASHIMA	U OF TOKYO
PS - H.	OYA	U OF TOHOKU
PS - A.	NISHIDA	U OF TOKYO

BRIEF DESCRIPTION

THIS MISSION WAS PART OF THE JAPANESE CONTRIBUTION TO THE INTERNATIONAL MAGNETOSPHERIC STUDY AND CARRIED OUT COORDINATED OBSERVATIONS WITH KYOKKO. INVESTIGATIONS OF CORRELATED MECHANISMS BETWEEN PARTICLES AND FIELDS AND PLASMA TURBULENCE WERE MADE BY MAKING OBSERVATIONS OF THE DETAILED STRUCTURE OF THE PLASMASPHERE WITH IN SITU MEASUREMENT TECHNIQUES USING PLASMA WAVE PHENOMENA AND ELECTROSTATIC PARTICLE ANALYZERS. THE SPACECRAFT, A 12-SIDED POLYGON, CARRIED DIPOLE EXTENDABLE ANTENNAE WITH LENGTHS OF 103 M AND 69.6 M AND A 1-M BOOM FOR A VECTOR MAGNETOMETER. A SOLAR PANEL ARRAY PROVIDED 30 W INTO A BATTERY AND REGULATOR SYSTEM. THE SPACECRAFT SPIN STABILIZED AT 150 RPM, DROPPING TO 3 RPM WHEN THE TWO SETS OF ANTENNAE WERE EXTENDED. ATTITUDE WAS MEASURED WITH A SUN SENSOR TO AN ACCURACY OF 0.5 DEG. A 0.5-W 136-MHZ PCM/PM TELEMETRY SYSTEM HANDLED 256 OR 1024 BPS AND A 2-W 400-MHZ PM SYSTEM HANDLED WIDEBAND 10-KHZ OR 3-KHZ DATA. DATA ACQUISITION WAS REAL TIME EXCEPT FOR A 10K-BYTE MEMORY FOR HOUSEKEEPING AND PLASMA PARAMETER DATA.

----- JIKIKEN, AOYAMA -----

INVESTIGATION NAME- FLUXGATE MAGNETOMETER (MGF)

NSSDC ID- 78-087A-05 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - I.	AOYAMA	TOKAI U
OI - T.	SAITO	U OF TOHOKU
OI - F.	TOYAMA	TOKAI U
OI - K.	YUMOTO	U OF TOHOKU

BRIEF DESCRIPTION

MAGNETIC FIELD INTENSITIES WERE MEASURED USING A THREE AXIS FLUXGATE MAGNETOMETER WITH ACCURACY OF SEVERAL NT (GAMMAS). PC-1 PULSATIONS ACROSS THE PLASMAPAUSE WERE STUDIED. THE SENSORS WERE SAMPLED SIMULTANEOUSLY EVERY 1 OR 4 S. THERE WERE FOUR RANGES OF SENSITIVITY WHICH CHANGED AUTOMATICALLY: PLUS OR MINUS 48, 640, 8282, 1370, AND 247 NT.

----- JIKIKEN, EJIRI -----

INVESTIGATION NAME- IMPEDANCE AND ELECTRIC FIELD (IEF)

NSSDC ID- 78-087A-04 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - M.	EJIRI	U OF TOKYO
OI - A.	NISHIDA	U OF TOKYO
OI - Y.	WATANABE	U OF TOKYO
OI - T.	OGAWA	KYOTO U

BRIEF DESCRIPTION

A SWEEP FREQUENCY IMPEDANCE PROBE MEASURED FROM .02 TO 3 MHZ USING A 103-M (TIP-TO-TIP) ANTENNA. THIS PROVIDED BASIC DATA FOR CALIBRATION OF NATURAL PLASMA WAVE DETECTIONS AND DATA FOR THE ESTIMATION OF THE TRANSMISSION EFFICIENCY FOR PLASMA WAVE STIMULATIONS. ELECTRON DENSITY WAS MEASURED INDEPENDENTLY OF ALL OTHER TECHNIQUES AND MEASURED ACCURATELY BY CANCELING STRAY CAPACITANCE. USING THE SAME ANTENNA, ELECTRIC FIELDS FROM DC TO 1 KHZ WERE MEASURED. THE SPACECRAFT BODY WAS COATED WITH CONDUCTIVE MATERIALS TO AVOID THE GENERATION OF LOCAL ELECTRIC FIELDS SO ACCURATE MEASUREMENTS OF NATURAL FIELDS COULD BE MADE.

----- JIKIKEN, KAWASHIMA -----

INVESTIGATION NAME- CONTROLLED ELECTRON BEAM EMISSIONS (CBE)

NSSDC ID- 78-087A-07 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - N.	KAWASHIMA	U OF TOKYO
OI - S.	MURASATO	U OF TOKYO

BRIEF DESCRIPTION

THIS EXPERIMENT PROVIDED IMPORTANT EFFECTS FOR THE ANALYSES OF WAVE/PARTICLE INTERACTIONS. SPACECRAFT POTENTIAL WAS CONTROLLED BY THE EMISSION OF ELECTRON BEAMS THAT COULD BE VARIED IN ENERGY FROM 100 TO 200 EV IN 4 STEPS TO ALLOW OTHER INSTRUMENTS TO MAKE ACCURATE MEASUREMENTS OF LOW ENERGY IONS AND ELECTRONS. THE BEAMS COULD ALSO CAUSE PLASMA INSTABILITIES THAT RESULTED IN THE PRODUCTION OF MANY KINDS OF PLASMA WAVES. BEAM CURRENTS OF 0.25, 0.5, 0.75, AND 1.0 MA COULD BE SELECTED FOR ANY ENERGY OR AN AUTOMATIC MODE COULD BE SELECTED WHERE ENERGY AND BEAM CURRENT WERE CHANGED EVERY 8 OR 32 S.

----- JIKIKEN, KIMURA -----

INVESTIGATION NAME- VLF DOPPLER PROPAGATION (DPL)

NSSDC ID- 78-087A-03 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - I.	KIMURA	KYOTO U
OI - K.	HASHIMOTO	KYOTO U

BRIEF DESCRIPTION

THIS EXPERIMENT INVOLVED DETECTING THE NWC 22.3 KHZ SIGNAL TRANSMITTED REGULARLY FROM AUSTRALIA WITH ONE OF THE TWO LONG DIPOLE ANTENNAE (69.6 M AND 103 M TIP-TO-TIP) EXTENDED PERPENDICULAR TO THE SPACECRAFT SPIN AXIS. THIS SIGNAL WAS HETERODYNED DOWN TO 590 HZ, AMPLIFIED WITH A BAND WIDTH OF 100 HZ AND TRANSMITTED TO THE GROUND ON A WIDE BAND ANALOG CHANNEL. THE ELECTRIC FIELD INTENSITY OF THE NWC SIGNAL WAS TELEMETERED VIA THE PCM SYSTEM. THE ANTENNA IMPEDANCE WAS ALSO OBSERVED.

----- JIKIKEN, KUBO -----

INVESTIGATION NAME- ENERGY SPECTRUM OF PARTICLES (ESP)

NSSDC ID- 78-087A-06 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - H.	KUBO	U OF TOKYO
OI - N.	KAWASHIMA	U OF TOKYO
OI - T.	MUKAI	U OF TOKYO
OI - T.	ARAKAWA	U OF TOKYO

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A HEMISPHERICAL ELECTROSTATIC ANALYZER FOR ELECTRONS AND A CYLINDRICAL ONE FOR IONS. THE ENERGY RANGE FOR ELECTRONS WAS 5 EV TO 11 KEV AND FOR IONS WAS 0.02 TO 30 KEV/Q. THE ENERGY RESOLUTION FOR BOTH ANALYZERS (DELTA E/E) WAS 0.6. BESIDES BEING USED TO OBTAIN SPECTRA, THE INSTRUMENT WAS USED TO INVESTIGATE WAVE-PARTICLE INTERACTIONS AND DETERMINE THE RESPONSE OF THE MAGNETOSPHERIC PLASMA WHEN THE STIMULATED PLASMA WAVE TRANSMITTER OR THE CONTROLLED ELECTRON BEAM EXPERIMENT WERE OPERATING.

----- JIKIKEN, OYA -----

INVESTIGATION NAME- STIMULATED PLASMA WAVE (SPW)

NSSDC ID- 78-087A-01 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - H.	OYA	U OF TOHOKU
OI - T.	KAMADA	NAGOYA U
OI - T.	ONO	U OF TOHOKU

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO EXCITE PLASMA WAVES BY TRANSMITTING 300-W PULSES FROM A 103-M (TIP-TO-TIP) ANTENNA IN THE FREQUENCY RANGE .02 TO 3 MHZ. THE FREQUENCY COULD BE CHANGED IN A CONTINUOUS SWEEP OR STEPPED THROUGH FIXED FREQUENCIES TO OBTAIN ELECTRON TEMPERATURE, TEMPERATURE ANISOTROPY, AND ELECTRON DENSITY. PLASMA INSTABILITIES AND NONLINEAR WAVE/PARTICLE INTERACTIONS WERE STUDIED.

----- JIKIKEN, OYA -----

INVESTIGATION NAME- NATURAL PLASMA WAVES (NPW)

NSSDC ID- 78-087A-02

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - H.	OYA	U OF TOHOKU
OI - H.	MATSUMOTO	KYOTO U
OI - J.	OHITSU	NAGOYA U
OI - A.	MORIOKA	U OF TOHOKU
OI - T.	MIYATAKE	U OF ELECTRO-COMMUN
OI - I.	KIMURA	KYOTO U
OI - K.	MIYAOKA	U OF TOHOKU

BRIEF DESCRIPTION

THIS EXPERIMENT USED A 103-M (TIP-TO-TIP) DIPOLE ANTENNA OR A CORED LOOP ANTENNA CONSISTING OF 76 TURNS WITH A DIAMETER OF 15.5 CM FOR DETECTING VLF WAVES FROM 0.75 TO 10 KHZ WITH A WIDEBAND RECEIVER. HECTOMETRIC, DECA-METRIC, AND KILOMETRIC WAVES IN THE RANGE FROM .01 TO 3 MHZ. CONSEQUENTLY, VLF WAVES IN THE PLASMASPHERE, ELECTROSTATIC PLASMA WAVES IN THE MAGNETOSPHERE, AND RADIO WAVES FROM THE EARTH AND PLANETS WERE DETECTED. CORRELATED OBSERVATIONS WITH THE VLF TRANSMITTER AT SIPLE STATION WERE PLANNED. FLUCTUATIONS OF THE ELECTRIC FIELD UP TO 450 HZ WERE OBTAINED WITH A LANGMUIR PROBE. THE BANDWIDTH AND SWEEP TIME OF THE FREQUENCY ANALYZER COULD BE SELECTED BY CHOOSING ONE OF FOUR MODES: NPW-A, -V, -VL, AND -S.

***** KYOKKO*****

SPACECRAFT COMMON NAME- KYOKKO
ALTERNATE NAMES- EXOSPHERIC SAT. A, EXOS 1
EXOS A, 10664

NSSDC ID- 78-014A

LAUNCH DATE- 02/04/78 WEIGHT- 130. KG
LAUNCH SITE- KAGOSHIMA, JAPAN
LAUNCH VEHICLE- M-3H

SPONSORING COUNTRY/AGENCY
JAPAN ISAS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 02/06/78
ORBIT PERIOD- 134. MIN INCLINATION- 65.4 DEG
PERIAPSIS- 642. KM ALT APDAPSIS- 3977. KM ALT

PERSONNEL
PM - K. HIRAO U OF TOKYO
PS - T. ITOH U OF TOKYO

BRIEF DESCRIPTION

THIS SATELLITE WAS A PART OF JAPAN'S CONTRIBUTION TO THE INTERNATIONAL MAGNETOSPHERIC STUDY. THE MISSION OBJECTIVES WERE TO OBSERVE THE AURORA BOREALIS, STUDY AURORA-RELATED PHENOMENA, AND STUDY THE IONSHERE AND MAGNETOSPHERE. THE MAIN BODY OF THE SPACECRAFT WAS A CYLINDER 0.946 M IN DIAMETER WITH SHALLOW TRUNCATED CONES ATTACHED AT BOTH ENDS. MOST OF THE SURFACE WAS COVERED WITH SOLAR CELLS THAT PRODUCED 35 W. TWO BOOMS OF ROUGHLY 1.9 M EACH EXTENDED OUTWARD FROM THE EQUATOR OF THE MAIN BODY. AT THE TIP OF EACH BOOM WAS A PERMANENT MAGNET (50 A-SQ M) TO PROVIDE ALIGNMENT OF THE SPACECRAFT CENTER AXIS ALONG THE LOCAL GEOMAGNETIC FIELD LINE. TWO SETS OF CIRCULARLY POLARIZED QUADRUPOLE ANTENNAE, ONE FOR UHF (400 MHZ) AND ANOTHER FOR VHF, EXTENDED FROM OPPOSITE ENDS OF THE SPACECRAFT. THE UHF ANTENNA WAS DIXELED FOR TELEMETRY (136 MHZ) AND COMMAND (148 MHZ). OTHER ATTITUDE SENSORS INCLUDED A VECTOR MAGNETOMETER AND A SOLAR SENSOR. THE SPACECRAFT CONTAINED A TAPE RECORDER TO STORE 160 MIN OF DATA AT 512 BPS OR 40 MIN AT 2048 BPS WITH READOUT IN 10 MIN AT 8192 BPS. BESIDES THE SOLAR CELLS, THERE WAS A NICKEL-CADMIUM BATTERY FOR NIGHTTIME OPERATION.

----- KYOKKO, IWAMOTO-----

INVESTIGATION NAME- ION MASS SPECTROMETER

NSSDC ID- 78-014A-06 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
IONOSPHERES

PERSONNEL
PI - I. IWAMOTO RADIO RESEARCH LAB
OI - E. SAGAWA RADIO RESEARCH LAB

BRIEF DESCRIPTION

THE INSTRUMENT MEASURED UPPER-ATMOSPHERE IONS IN THE RANGES 1 TO 4 AND 14 TO 16 AMU AND CONSISTED OF A QUADRUPOLE MASS FILTER AND A CHANNEL ELECTRON MULTIPLIER. THE ION INLET WAS LOCATED ON THE FORWARD END OF THE SPACECRAFT MAIN BODY.

----- KYOKKO, KANEDA-----

INVESTIGATION NAME- UV AURORAL TV IMAGING

NSSDC ID- 78-014A-03 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
AERONOMY
PARTICLES AND FIELDS

PERSONNEL
PI - E. KANEDA U OF TOKYO
OI - N. NIWA U OF TOKYO
OI - M. TAKAGI U OF TOKYO

BRIEF DESCRIPTION

THE INSTRUMENT WAS A TV CAMERA THAT CONSISTED OF AN IMAGE-MEMORY TUBE WITH A SLOW-SCAN READOUT. THE PHOTOELECTRIC SURFACE WAS POTASSIUM BROMIDE WITH A MAGNESIUM FLUORIDE FACEPLATE THAT MADE IT SENSITIVE TO PHOTONS AROUND 1300 A. A PAIR OF SPHERICAL MIRRORS PRODUCED AN IMAGE ON THE PHOTOELECTRIC SURFACE. AN AURORAL PATTERN WAS MEASURED EVERY 128 S WHEN THE SATELLITE WAS OVER THE ARCTIC. THE NUMBER OF PIXELS IN AN IMAGE FRAME WAS 178 X 198 AND THE CAMERA FIELD OF VIEW WAS 60 DEG.

----- KYOKKO, MUKAI-----

INVESTIGATION NAME- ELECTRON ENERGY ANALYZER

NSSDC ID- 78-014A-02 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
AERONOMY

PERSONNEL
PI - T. MUKAI U OF TOKYO

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTED OF TWO SPHERICAL ELECTROSTATIC ANALYZERS, ONE MOUNTED AT THE FRONT AND ONE AT THE BACK OF THE SPACECRAFT TO VIEW THE ELECTRONS STREAMING EITHER DOWN THE MAGNETIC FIELD LINE OR TOWARD THE EQUATOR. EACH ANALYZER COVERED THE ENERGY RANGE FROM 4.5 EV TO 11.3 KEV IN NINE SPECTRAL BANDS.

----- KYOKKO, NAKAMURA-----

INVESTIGATION NAME- UV GLOW SPECTROPHOTOMETER

NSSDC ID- 78-014A-05 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
PLANETARY ATMOSPHERES

PERSONNEL
PI - M. NAKAMURA TSUKUBA U
OI - T. WATANABE TSUKUBA U

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTED OF A GRATING SPECTROGRAPH WITH A RESOLUTION OF 10 A AND VIBRATING SLIT. THE SPECTRUM WAS SCANNED IN A WIDTH OF PLUS OR MINUS 15 A AROUND THE FOLLOWING SPECTRAL LINES: 304 A (HE PLUS), 584 A (HE), 833 A (O PLUS), 1216 A (H, LYMAN-ALPHA) AND 1304 A (O). FIVE CHANNEL MULTIPLIERS, ONE FOR EACH SPECTRAL LINE, WERE USED TO MEASURE INTENSITY. THE UV GLOW FROM THE ATMOSPHERE, MAGNETOSPHERE, AND INTERPLANETARY SPACE WAS OBSERVED.

----- KYOKKO, OYAMA-----

INVESTIGATION NAME- ELECTRON PROBES

NSSDC ID- 78-014A-01 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES

PERSONNEL
PI - K. OYAMA U OF TOKYO
OI - K. HIRAO U OF TOKYO

BRIEF DESCRIPTION

THE EXPERIMENT WAS COMPRISED OF SEVERAL INSTRUMENTS DESIGNED TO MEASURE ELECTRON TEMPERATURE AND DENSITY AS WELL AS IONIC COMPOSITION. THE ELECTRON TEMPERATURE PROBE WAS AN RF-RECTIFIER TYPE, AND A LANGMUIR PROBE WAS USED TO OBTAIN ELECTRON DENSITY.

----- KYOKKO, YOSHINO-----

INVESTIGATION NAME- ELECTROSTATIC PLASMA WAVE MEASUREMENT

NSSDC ID- 78-014A-04

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - T.	YOSHINO	U OF ELECTRO-COMMUN
OI - R.	NAKAMURA	U OF TOKYO
OI - T.	ITO	U OF TOKYO

BRIEF DESCRIPTION

THIS INVESTIGATION INVOLVED ELECTROSTATIC WAVES IN THE MAGNETOSPHERE IN THE FREQUENCY RANGE 0.4 TO 30 KHZ AND RADIO WAVES BETWEEN 0.045 AND 3 MHZ. TWO FARADAY CUPS WERE EMPLOYED TO PICK UP ELECTROSTATIC WAVES, WHILE A DIPOLE ANTENNA WAS USED TO RECEIVE RADIO WAVES. THE DIPOLE ANTENNA CONSISTED OF A PAIR OF THIN WIRES 1.9 M LONG AND WAS ATTACHED ALONG THE EXTENDABLE STABILIZATION BOOMS. ONE FARADAY CUP WAS MOUNTED TO LOOK PARALLEL TO THE SPIN AXIS AND THE OTHER PERPENDICULAR TO THE SPIN AXIS. WAVES IN THE 0.4 TO 30 KHZ RANGE WERE RECEIVED BY WIDEBAND RECEIVERS AND TELEMETERED IN ANALOG FORM. THE WAVE STRENGTH IN THE 0.045 TO 3 MHZ RANGE WAS MEASURED IN 11 BANDS.

***** LANDSAT 2*****

SPACECRAFT COMMON NAME- LANDSAT 2
ALTERNATE NAMES- EARTH RES TECH SAT.-B, PL-733D
ERTS-B, 07615

NSSDC ID- 75-004A

LAUNCH DATE- 01/22/75 WEIGHT- 816. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS	EPOCH DATE- 01/25/75
ORBIT TYPE- GEOCENTRIC	INCLINATION- 99.09 DEG
ORBIT PERIOD- 103.28 MIN	APOAPSIS- 918. KM ALT
PERIAPSIS- 907. KM ALT	

PERSONNEL

MG - B.T. NOLAN	NASA HEADQUARTERS
SC - R.I. WHITMAN	NASA HEADQUARTERS
PM - C.M. MACKENZIE	NASA-GSFC
PS - S.C. FREDEN	NASA-GSFC

BRIEF DESCRIPTION

LANDSAT 2 WAS THE SECOND OF A SERIES OF MODIFIED NIMBUS SATELLITES. THE NEAR-POLAR ORBITING SPACECRAFT SERVED AS A STABILIZED, EARTH-ORIENTED PLATFORM FOR OBTAINING INFORMATION ON AGRICULTURAL AND FORESTRY RESOURCES, GEOLOGY AND MINERAL RESOURCES, HYDROLOGY AND WATER RESOURCES, GEOGRAPHY, CARTOGRAPHY, ENVIRONMENTAL POLLUTION, OCEANOGRAPHY AND MARINE RESOURCES, AND METEOROLOGICAL PHENOMENA. TO ACCOMPLISH THESE OBJECTIVES THE SPACECRAFT WAS EQUIPPED WITH (1) A FIVE-CHANNEL MULTISPECTRAL SCANNER (MSS) AND A THREE-CAMERA RETURN BEAM VIDICON (RBV) TO OBTAIN BOTH VISIBLE AND IR PHOTOGRAPHIC AND RADIOMETRIC IMAGES OF THE EARTH, (2) A DATA COLLECTION SYSTEM TO COLLECT INFORMATION FROM REMOTE INDIVIDUALLY EQUIPPED GROUND STATIONS AND TO RELAY THE DATA TO CENTRAL ACQUISITION STATIONS. LANDSAT 2 CARRIED TWO WIDE-BAND VIDEO TAPE RECORDERS (WBVTR) CAPABLE OF STORING UP TO 30 MIN OF SCANNER OR CAMERA DATA TO GIVE THE SPACECRAFT'S SENSORS A NEAR-GLOBAL COVERAGE CAPABILITY. AN ADVANCED ATTITUDE CONTROL SYSTEM CONSISTING OF HORIZON SCANNERS, SUN SENSORS, AND A COMMAND ANTENNA COMBINED WITH A FREON GAS PROPULSION SYSTEM PERMITTED THE SPACECRAFT'S ORIENTATION TO BE CONTROLLED TO WITHIN PLUS OR MINUS 0.7 DEG IN ALL THREE AXES. SPACECRAFT COMMUNICATIONS INCLUDED A COMMAND SUBSYSTEM OPERATING AT 154.2 AND 2106.4 MHZ AND A PCM NARROW-BAND TELEMETRY SUBSYSTEM, OPERATING AT 2287.5 AND 137.86 MHZ, FOR SPACECRAFT HOUSEKEEPING, ATTITUDE, AND SENSOR PERFORMANCE DATA. VIDEO DATA FROM THE THREE-CAMERA RBV SYSTEM WAS TRANSMITTED IN BOTH REAL TIME AND FROM WBVTR AT 2276.5 MHZ, WHILE INFORMATION FROM THE MSS WAS CONSTRAINED TO A 20-MHZ RF BANDWIDTH AT 2229.5 MHZ.

----- LANDSAT 2, BALLA-----

INVESTIGATION NAME- MULTISPECTRAL SCANNER (MSS)

NSSDC ID- 75-004A-02 INVESTIGATIVE PROGRAM
CODE ER

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY
METEOROLOGY

PERSONNEL

PI - J.A. BALLA	NASA-GSFC
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BRIEF DESCRIPTION

THE LANDSAT 2 MULTISPECTRAL SCANNER (MSS) WAS DESIGNED TO PROVIDE REPETITIVE DAY-NIGHT ACQUISITION OF HIGH-RESOLUTION MULTISPECTRAL DATA OF THE EARTH'S SURFACE ON A GLOBAL BASIS. WHILE ITS PRIMARY FUNCTION WAS TO OBTAIN INFORMATION IN VARIOUS AREAS SUCH AS AGRICULTURE, FORESTRY, GEOLOGY, AND HYDROLOGY, THE MSS SYSTEM WAS ALSO USED FOR OCEANOGRAPHIC AND METEOROLOGICAL PURPOSES, I.E., TO MAP SEA-ICE FIELDS, LOCATE AND TRACK MAJOR OCEAN CURRENTS, MONITOR BOTH AIR AND WATER

POLLUTION, DETERMINE SNOW COVER, INVESTIGATE SEVERE STORM ENVIRONMENTS, ETC. THE MSS CONSISTED OF A 22.86-CM DOUBLE REFLECTOR-TYPE TELESCOPE, SCANNING MIRROR, FILTERS, DETECTORS, AND ASSOCIATED ELECTRONICS. THE SCANNER OPERATED IN THE FOLLOWING SPECTRAL INTERVALS -- BAND 1 - 0.5 TO 0.6 MICROMETER, BAND 2 - 0.6 TO 0.7 MICROMETER, BAND 3 - 0.7 TO 0.8 MICROMETER, BAND 4 - 0.8 TO 1.1 MICROMETERS, AND BAND 5 - 10.4 TO 12.6 MICROMETERS. THIS LAST BAND WHICH LIES IN THE THERMAL (EMISSIVE) PART OF THE SPECTRUM, GAVE LANDSAT 2 NIGHTTIME SENSING CAPABILITIES, A FEATURE LACKING IN THE MSS ON LANDSAT 1. INCOMING RADIATION WAS COLLECTED BY THE SCANNING MIRROR, WHICH OSCILLATED 2.89 DEG TO EITHER SIDE OF NADIR AND SCANNED CROSS-TRACK SWATHS 185-KM WIDE. THE ALONG-TRACK SCAN WAS PRODUCED BY THE ORBITAL MOTION OF THE SPACECRAFT. THE PRIMARY IMAGE PRODUCED AT THE IMAGE PLANE WAS RELAYED BY USE OF FIBER-OPTIC BUNDLES TO DETECTORS WHERE CONVERSION TO AN ELECTRONIC SIGNAL WAS ACCOMPLISHED. OPTICAL FILTERS WERE USED TO PRODUCE THE DESIRED SPECTRAL SEPARATION. SIX DETECTORS WERE EMPLOYED IN EACH OF THE FIRST FOUR SPECTRAL BANDS AND TWO IN THE FIFTH BAND -- BANDS 1 THROUGH 3 USED PHOTOMULTIPLIER TUBES AS DETECTORS, BAND 4 USED SILICON PHOTODIODES, AND BAND 5 USED MERCURY-CADMIUM-TELLURIDE DETECTORS. A MULTIPLEXER INCLUDED IN THE MSS SYSTEM PROCESSED THE SCANNER'S 26 CHANNELS OF DATA. THESE DATA WERE TIME-MULTIPLIED AND THEN CONVERTED TO A PULSE-CODE MODULATED SIGNAL BY AN A/D CONVERTER. THE DATA WERE THEN TRANSMITTED (AT 2229.5 MHZ) DIRECTLY TO AN ACQUISITION STATION OR STORED ON MAGNETIC TAPE FOR SUBSEQUENT PLAYBACK THE NEXT TIME THE SPACECRAFT COMES WITHIN COMMUNICATION RANGE OF AN ACQUISITION STATION. DATA FROM THIS EXPERIMENT ARE HANDLED BY THE NASA DATA PROCESSING FACILITY, GSFC, GREENBELT, MD, AND ARE AVAILABLE TO APPROVED INVESTIGATORS THROUGH ITS LANDSAT USERS SERVICES SECTION. ALL OTHER INTERESTED INDIVIDUALS MAY OBTAIN DATA THROUGH THE EARTH RESOURCES DATA CENTER, DEPARTMENT OF THE INTERIOR, SIOUX FALLS, SD.

***** LANDSAT 3*****

SPACECRAFT COMMON NAME- LANDSAT 3
ALTERNATE NAMES- EARTH RES TECH SAT.-C, ERTS-C
10702

NSSDC ID- 78-026A

LAUNCH DATE- 03/05/78 WEIGHT- 960. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS	EPOCH DATE- 03/06/78
ORBIT TYPE- GEOCENTRIC	INCLINATION- 99.1 DEG
ORBIT PERIOD- 103.1 MIN	APOAPSIS- 914. KM ALT
PERIAPSIS- 897. KM ALT	

PERSONNEL

MG - B.T. NOLAN	NASA HEADQUARTERS
SC - R.I. WHITMAN	NASA HEADQUARTERS
PM - C.M. MACKENZIE	NASA-GSFC
PS - S.C. FREDEN	NASA-GSFC

BRIEF DESCRIPTION

LANDSAT 3 WAS A MODIFIED VERSION OF THE NIMBUS SATELLITE, WITH THE GENERAL MISSION OBJECTIVES OF EXTENDING THE PERIOD OF SPACE-DATA ACQUISITION FOR EARTH RESOURCES INITIATED BY LANDSAT 1 (FORMERLY ERTS 1) AND CONTINUED BY LANDSAT 2. THE NEAR-POLAR ORBITING SPACECRAFT SERVED AS A STABILIZED, EARTH-ORIENTED PLATFORM FOR OBTAINING INFORMATION ON AGRICULTURAL AND FORESTRY RESOURCES, GEOLOGY AND MINERAL RESOURCES, HYDROLOGY AND WATER RESOURCES, GEOGRAPHY, CARTOGRAPHY, ENVIRONMENTAL POLLUTION, OCEANOGRAPHY AND MARINE RESOURCES, AND METEOROLOGICAL PHENOMENA. TO ACCOMPLISH THESE OBJECTIVES, THE SPACECRAFT WAS EQUIPPED WITH (1) A FIVE-CHANNEL MULTISPECTRAL SCANNER (MSS) AND A TWO-CAMERA RETURN BEAM VIDICON (RBV) TO OBTAIN BOTH VISIBLE AND IR PHOTOGRAPHIC AND RADIOMETRIC IMAGES OF THE EARTH, AND (2) A DATA COLLECTION SYSTEM TO COLLECT INFORMATION FROM REMOTE INDIVIDUALLY EQUIPPED GROUND STATIONS AND TO RELAY THE DATA TO CENTRAL ACQUISITION STATIONS. LANDSAT-C CARRIED TWO WIDE-BAND VIDEO TAPE RECORDERS (WBVTR) CAPABLE OF STORING UP TO 30 MIN OF SCANNER OR CAMERA DATA TO GIVE THE SPACECRAFT'S SENSORS A NEAR-GLOBAL COVERAGE CAPABILITY. AN ADVANCED ATTITUDE CONTROL SYSTEM CONSISTING OF HORIZON SCANNERS, SUN SENSORS, AND A COMMAND ANTENNA COMBINED WITH FREON GAS PROPULSION SYSTEM PERMITTED THE SPACECRAFT'S ORIENTATION TO BE CONTROLLED TO WITHIN PLUS OR MINUS 1.0 DEG IN ALL THREE AXES. SPACECRAFT COMMUNICATIONS INCLUDED A COMMAND SUBSYSTEM OPERATING AT 154.2 AND 2106.4 MHZ AND A PCM NARROW-BAND TELEMETRY SUBSYSTEM, OPERATING AT 2287.5 AND 137.86 MHZ, FOR SPACECRAFT HOUSEKEEPING, ATTITUDE, AND SENSOR PERFORMANCE DATA. VIDEO DATA FROM THE TWO-CAMERA RBV SYSTEM WERE TRANSMITTED IN BOTH REAL TIME AND FROM THE WIDE-BAND RECORDER SYSTEM AT 2265.5 MHZ, WHILE INFORMATION FROM THE MSS WAS CONSTRAINED TO A 20-MHZ RF BANDWIDTH AT 2229.5 MHZ.

----- LANDSAT 3, BALLA-----

INVESTIGATION NAME- MULTISPECTRAL SCANNER (MSS)

EARTH RESOURCES SURVEY

PERSONNEL

PI - J.A. BALLA

NASA-GSFC

BRIEF DESCRIPTION

THE LANDSAT 3 MULTISPECTRAL SCANNER (MSS) PROVIDED REPETITIVE DAY/NIGHT ACQUISITION OF HIGH-RESOLUTION MULTISPECTRAL DATA OF THE EARTH'S SURFACE ON A GLOBAL BASIS. WHILE ITS PRIMARY FUNCTION WAS TO OBTAIN DATA IN VARIOUS AREAS SUCH AS AGRICULTURE, FORESTRY, GEOLOGY, AND HYDROLOGY, THE MSS SYSTEM WAS ALSO USED FOR OCEANOGRAPHIC AND METEOROLOGICAL PURPOSES, I.E., TO MAP SEA-ICE FIELDS, LOCATE AND TRACK MAJOR OCEAN CURRENTS, MONITOR BOTH AIR AND WATER POLLUTION, DETERMINE SNOW COVER, INVESTIGATE SEVERE STORM ENVIRONMENTS, ETC. THE MSS CONSISTED OF A DOUBLE REFLECTOR-TYPE TELESCOPE, SCANNING MIRROR, FILTERS, DETECTORS, AND ASSOCIATED ELECTRONICS. THE SCANNER OPERATED IN THE FOLLOWING SPECTRAL INTERVALS -- BAND 1 - 0.5 TO 0.6 MICROMETER, BAND 2 - 0.6 TO 0.7 MICROMETER, BAND 3 - 0.7 TO 0.8 MICROMETER, BAND 4 - 0.8 TO 1.1 MICROMETERS, AND BAND 5 - 10.4 TO 12.6 MICROMETERS. THIS LAST BAND, WHICH LAY IN THE THERMAL (EMISSIVE) PART OF THE SPECTRUM, GAVE LANDSAT 3 NIGHTTIME SENSING CAPABILITIES, A FEATURE LACKING IN THE MSS IN LANDSAT 1. INCOMING RADIATION WAS COLLECTED BY THE SCANNING MIRROR, WHICH OSCILLATED 2.89 DEG TO EITHER SIDE OF NADIR AND SCANNED CROSS-TRACK SWATHS 185-KM WIDE. THE ALONG-TRACK SCAN WAS PRODUCED BY THE ORBITAL MOTION OF THE SPACECRAFT. THE PRIMARY IMAGE PRODUCED AT THE IMAGE PLANE WAS RELAYED BY USE OF FIBER-OPTIC BUNDLES TO DETECTORS WHERE CONVERSION TO AN ELECTRONIC SIGNAL WAS ACCOMPLISHED. OPTICAL FILTERS WERE USED TO PRODUCE THE DESIRED SPECTRAL SEPARATION. SIX DETECTORS WERE EMPLOYED IN EACH OF THE FIRST FOUR SPECTRAL BANDS AND TWO IN THE FIFTH BAND -- BANDS 1 THROUGH 3 USED PHOTOMULTIPLIER TUBES AS DETECTORS, BAND 4 USED SILICON PHOTODIODES, AND BAND 5 USED MERCURY-CADMIUM-TELLURIDE DETECTORS. THE MINIMUM DIMENSIONS THAT WERE RESOLVED BY THE MSS WERE 80 M FOR BANDS 1 THROUGH 4 AND 240 M FOR BAND 5. A MULTIPLEXER INCLUDED IN THE MSS SYSTEM PROCESSED THE SCANNER'S 26 CHANNELS OF DATA. THESE DATA WERE TIME-MULTIPLEXED AND THEN CONVERTED TO A PCM SIGNAL BY AN A/D CONVERTER. THE DATA WERE TRANSMITTED (AT 2229.5 MHZ) DIRECTLY TO AN ACQUISITION STATION OR STORED ON MAGNETIC TAPE FOR SUBSEQUENT PLAYBACK THE NEXT TIME THE SPACECRAFT CAME WITHIN COMMUNICATION RANGE OF AN ACQUISITION STATION. DATA FROM THIS EXPERIMENT ARE HANDLED BY THE NASA DATA PROCESSING FACILITY, GSFC, GREENBELT, MD, AND ARE MADE AVAILABLE TO APPROVED INVESTIGATORS THROUGH ITS LANDSAT USERS SERVICES. ALL OTHER INTERESTED INDIVIDUALS ARE TO OBTAIN DATA THROUGH THE EARTH RESOURCES DATA CENTER, DEPARTMENT OF THE INTERIOR, SIOUX FALLS, SD.

----- LANDSAT 3, GILBERT-----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)

NSSDC ID- 78-026A-03

INVESTIGATIVE PROGRAM
CODE ERINVESTIGATION DISCIPLINE(S)
METEOROLOGY
EARTH RESOURCES SURVEY

PERSONNEL

PI - E.L. GILBERT

NASA-GSFC

BRIEF DESCRIPTION

THE LANDSAT 3 DATA COLLECTION SYSTEM (DCS) PROVIDED USERS WITH NEAR REAL-TIME DATA COLLECTED FROM VARIOUS REMOTE LOCATIONS. THE DCS WAS COMPOSED OF: (1) THE DATA COLLECTION PLATFORMS (DCP'S) WHICH MIGHT HAVE BEEN OCEAN BUOYS, CONSTANT PRESSURE BALLOONS OR AUTOMATIC GROUND STATIONS, (2) THE SATELLITE EQUIPMENT, AND (3) THE GROUND DATA CENTERS INCLUDING REMOTE RECEIVING SITES AND THE GROUND DATA HANDLING SYSTEM AT GSFC. USE OF THE LANDSAT SPACEBORNE DCS PROVIDED A CONTINUAL FLOW OF INFORMATION FOR BETTER MANAGEMENT OF WILDLIFE, MARINE, AGRICULTURE, WATER, AND FORESTRY RESOURCES AND LED TO IMPROVED WEATHER FORECASTS, POLLUTION CONTROL, AND EARTHQUAKE PREDICTION AND WARNING. THE ENVIRONMENTAL SENSORS MOUNTED ON A DCP WERE SELECTED BY INDIVIDUAL INVESTIGATORS TO SATISFY THEIR PARTICULAR REQUIREMENTS. FROM A PLANNED ORBIT OF 912 KM, THE SPACECRAFT WAS CAPABLE OF ACQUIRING DATA FROM DCP'S WITHIN A RADIUS OF APPROXIMATELY 3100 KM FROM THE SUBSATELLITE POINT, THUS ALLOWING DATA TO BE OBTAINED FROM ANY REMOTE PLATFORM AT LEAST ONCE EVERY 12 H. THE DCP'S TRANSMIT AT 401.55 MHZ. THE DCS EQUIPMENT, ESSENTIALLY A RECEIVER, RECEIVED AND RETRANSMITTED DATA (AT 2287.5 MHZ) TO SELECTED GROUND RECEIVING STATIONS. THERE WAS NO SIGNAL MULTIPLEXING OR DATA PROCESSING ON THE SATELLITE. THE LANDSAT-C DCS ACCOMMODATED UP TO 1000 DCP'S DEPLOYED THROUGHOUT THE CONTINENTAL US. DATA FROM THIS EXPERIMENT WERE HANDLED AND DISTRIBUTED TO THE VARIOUS PLATFORM INVESTIGATORS BY THE NASA DATA PROCESSING FACILITY, GSFC, GREENBELT, MD.

----- LANDSAT 3, WILSON-----

INVESTIGATION NAME- RETURN BEAM VIDICON CAMERA (RBV)

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

PERSONNEL

PI - L. WILSON

NASA-GSFC

BRIEF DESCRIPTION

THE LANDSAT 3 RETURN BEAM VIDICON (RBV) CAMERA SYSTEM CONTAINED TWO IDENTICAL CAMERAS COVERING THE SPECTRAL BAND FROM 0.53 TO 0.75 MICROMETER. THE TWO EARTH-ORIENTED CAMERAS WERE MOUNTED TO A COMMON BASE, STRUCTUALLY ISOLATED FROM THE SPACECRAFT TO MAINTAIN ACCURATE ALIGNMENT. EACH CAMERA CONTAINED AN OPTICAL LENS, A RBV SENSOR, A THERMOELECTRIC COOLER, DEFLECTION AND FOCUS COILS, A MECHANICAL SHUTTER, ERASE LAMPS, AND SENSOR ELECTRONICS. THE CAMERAS WERE ALIGNED TO VIEW ADJACENT 84-KM SQUARE GROUND SCENES WHICH OVERLAPPED SLIGHTLY SO THAT THE TOTAL WIDTH OF THE GROUND SCENE WAS 185 KM. THE CAMERAS WERE OPERATED EVERY 12.5 S TO PRODUCE OVERLAPPING IMAGES ALONG THE DIRECTION OF SPACECRAFT MOTION. AFTER SHUTTERING, THE IMAGE WAS SCANNED BY AN ELECTRON BEAM TO PRODUCE A VIDEO OUTPUT SIGNAL. THE TIMING CYCLE WAS ARRANGED SO THAT A 3.5-S OFFSET WAS INTRODUCED BETWEEN THE READOUTS OF THE TWO CAMERAS, PERMITTING SEQUENTIAL READOUT OF THE CAMERAS, ALLOWING THE SAME TAPE RECORDER AND COMMUNICATIONS CHANNEL TO BE USED. VIDEO DATA FROM THE RBV WERE TRANSMITTED (AT 2265.5 MHZ) IN BOTH REAL-TIME AND TAPE-RECORDER MODES. FROM A NOMINAL SPACECRAFT ALTITUDE OF 912 KM, THE RBV HAD A GROUND RESOLUTION OF 40 M (TWICE THE LANDSAT 1 RESOLUTION OF 80 M). DATA FROM THIS EXPERIMENT ARE HANDLED BY THE NASA DATA PROCESSING FACILITY, GSFC, GREENBELT, MD, AND ARE MADE AVAILABLE TO APPROVED INVESTIGATORS AND AGENCIES THROUGH ITS LANDSAT USERS SERVICES SECTION. ALL OTHER INTERESTED INDIVIDUALS CAN OBTAIN DATA THROUGH THE EARTH RESOURCES DATA CENTER, DEPARTMENT OF THE INTERIOR, SIOUX FALLS, SD.

***** MAGION*****

SPACECRAFT COMMON NAME- MAGION
ALTERNATE NAMES- 11110

NSSDC ID- 78-099C

LAUNCH DATE- 10/24/78
LAUNCH SITE- UNKNOWN, U.S.S.R.
LAUNCH VEHICLE- UNKNOWN

WEIGHT- KG

SPONSORING COUNTRY/AGENCY
U.S.S.R.
CZECHOSLOVAKIAINTERCOS
UNKNOWNINITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 96.4 MIN
PERIAPSIS- 407. KM ALTEPOCH DATE- 10/25/78
INCLINATION- 82.96 DEG
APOAPSIS- 768. KM ALT

PERSONNEL

PS - P. TRISKA

GEOPHYS INST CAS

BRIEF DESCRIPTION

MAGION WAS A CZECHOSLOVAKIAN SUBSATELLITE THAT SEPARATED FROM INTERCOSMOS 18. IT WAS BELIEVED TO CARRY IONOSPHERIC-TYPE EXPERIMENTS RELATED TO THE INTERNATIONAL MAGNETOSPHERIC STUDY (IMS). A REQUEST FOR INFORMATION ABOUT THE PAYLOAD HAS BEEN MADE.

***** METEOSAT 1*****

SPACECRAFT COMMON NAME- METEOSAT 1
ALTERNATE NAMES- METEOROLOGICAL SAT-A, METOSAT
10489

NSSDC ID- 77-108A

LAUNCH DATE- 11/23/77
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

WEIGHT- 625.8 KG

SPONSORING COUNTRY/AGENCY
INTERNATIONAL
UNITED STATESESA
NASA-OSTAINITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1411.5 MIN
PERIAPSIS- 34913. KM ALTEPOCH DATE- 11/24/77
INCLINATION- 0.7 DEG
APOAPSIS- 35692. KM ALT

PERSONNEL

PM - M. DELAHAIS
PS - D. LENNERTZESA-ESTEC
ESA-ESTEC

BRIEF DESCRIPTION

METOSAT WAS A GEOSTATIONARY SPACECRAFT AND SERVED AS PART OF EUROPEAN SPACE AGENCY'S (ESA) CONTRIBUTION TO GARP. AS PART OF GARP, THE SATELLITE HELPED TO SUPPLY DATA REQUIRED FOR GLOBAL DATA SETS USED IN IMPROVEMENT OF MACHINE WEATHER FORECASTS. IN GENERAL, THE SPACECRAFT DESIGN, INSTRUMENTATION, AND OPERATION WERE SIMILAR TO SMS/GOES. THE SPIN-STABILIZED SPACECRAFT CARRIED (1) A VISIBLE-IR RADIOMETER TO PROVIDE HIGH-QUALITY DAY/NIGHT CLOUDCOVER DATA AND TO TAKE RADIANCE

TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, (2) A METEOROLOGICAL DATA COLLECTION SYSTEM TO DISSEMINATE IMAGE DATA TO USER STATIONS, TO COLLECT DATA FROM VARIOUS EARTH-BASED PLATFORMS, AND TO RELAY DATA FROM POLAR ORBITING SATELLITES. THE CYLINDRICALLY-SHAPED SPACECRAFT MEASURED 210 CM IN DIAMETER AND 430 CM IN LENGTH, INCLUDING THE APOGEE BOOST MOTOR. THE PRIMARY STRUCTURAL MEMBERS WERE AN EQUIPMENT PLATFORM AND A CENTRAL TUBE. THE RADIOMETER TELESCOPE WAS MOUNTED ON THE EQUIPMENT PLATFORM AND VIEWED THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDED RADIALLY OUT FROM THE CENTRAL TUBE AND WAS AFFIXED TO THE SOLAR PANELS, WHICH FORMED THE OUTER WALLS OF THE SPACECRAFT AND PROVIDED THE PRIMARY SOURCE OF ELECTRICAL POWER. LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE CENTRAL TUBE AND THE SOLAR PANELS WERE STATIONKEEPING AND DYNAMICS CONTROL EQUIPMENT AND BATTERIES. PROPER SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) WERE MAINTAINED BY JET THRUSTERS MOUNTED ON THE SPACECRAFT AND ACTIVATED BY GROUND COMMAND. THE SPACECRAFT USED BOTH UHF-BAND AND S-BAND FREQUENCIES IN ITS TELEMETRY AND COMMAND SUBSYSTEMS. A LOW-POWER VHF TRANSPONDER PROVIDED TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVED AS A BACKUP FOR THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT ATTAINED SYNCHRONOUS ORBIT.

----- METEOSAT 1, ESA STAFF-----

INVESTIGATION NAME- IMAGING RADIOMETER

NSSDC ID- 77-108A-01 INVESTIGATIVE PROGRAM APPLICATIONS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - ESA STAFF ESA-ESTEC

BRIEF DESCRIPTION

THE VISIBLE-IR RADIOMETER FLOWN ON METEOSAT WAS CAPABLE OF PROVIDING DAY/NIGHT OBSERVATIONS OF CLOUDCOVER AND EARTH/CLOUD RADIANCE TEMPERATURE MEASUREMENTS FROM A SYNCHRONOUS, SPIN-STABILIZED SATELLITE FOR USED IN (1) OPERATIONAL WEATHER ANALYSIS AND FORECASTING AND, (2) SUPPORT TO GARP. THE FIVE-CHANNEL INSTRUMENT WAS ABLE TO TAKE FULL PICTURES OF THE EARTH'S DISK. THE THREE IR CHANNELS (TWO IN THE 10.5- TO 12.5-MICROMETER REGION AND ONE IN THE 5.7- TO 7.1-MICROMETER REGION), AND THE TWO VISIBLE CHANNELS (0.5 TO 0.9 MICROMETER) USED A COMMON OPTICS SYSTEM. INCOMING RADIATION WAS RECEIVED BY A SCAN MIRROR AND COLLECTED BY AN OPTICAL SYSTEM. THE SCAN MIRROR WAS SET AT A NOMINAL ANGLE OF 45 DEG TO THE RADIOMETER OPTICAL AXIS, WHICH WAS ALIGNED PARALLEL TO THE SPIN AXIS OF THE SPACECRAFT. THE SPINNING MOTION OF THE SPACECRAFT (APPROXIMATELY 100 RPM) PROVIDED A WEST-EAST SCAN MOTION WHEN THE SPIN AXIS OF THE SPACECRAFT WAS ORIENTED PARALLEL WITH THE EARTH'S AXIS. THE LATITUDINAL SCAN WAS ACCOMPLISHED BY SEQUENTIALLY TILTING THE SCANNING MIRROR AT THE COMPLETION OF EACH SPIN.

----- METEOSAT 1, ESA STAFF-----

INVESTIGATION NAME- DATA COLLECTION PLATFORM (DCP)

NSSDC ID- 77-108A-02 INVESTIGATIVE PROGRAM APPLICATIONS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - ESA STAFF ESA-ESTEC

BRIEF DESCRIPTION

THE DATA COLLECTION PLATFORM WAS DESIGNED TO (1) DISSEMINATE IMAGE DATA TO USER STATIONS, (2) COLLECT DATA FROM VARIOUS EARTH-BASED PLATFORMS, AND (3) PROVIDE FOR A SPACE-TO-SPACE RELAY FOR DATA FROM POLAR-ORBITING SATELLITES. THIS EXPERIMENT WAS SIMILAR TO THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM (WEFAX) FLOWN ON SMS 1, SMS 2, AND GOES SERIES SPACECRAFT. THIS EXPERIMENT OPERATED ON S-BAND FREQUENCIES FOR WEFAX TYPE TRANSMISSIONS AND UHF FOR DATA COLLECTION PLATFORM REPORT AND INTERROGATION.

***** NIMBUS 4*****

SPACECRAFT COMMON NAME- NIMBUS 4
ALTERNATE NAMES- NIMBUS-D, PL-701E
04362

NSSDC ID- 70-025A

LAUNCH DATE- 04/08/70 WEIGHT- 620. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- THOR

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 107.2 MIN
PERIAPSIS- 1092. KM ALT

EPGCH DATE- 04/09/70
INCLINATION- 80.114 DEG
APOAPSIS- 1108. KM ALT

PERSONNEL
MG - R.J. ARNOLD NASA HEADQUARTERS
PM - C.M. MACKENZIE NASA-GSFC
PS - M. TEPPER NASA-GSFC

BRIEF DESCRIPTION

NIMBUS 4, THE FOURTH IN A SERIES OF SECOND-GENERATION METEOROLOGICAL R AND D SATELLITES, WAS DESIGNED TO SERVE AS A STABILIZED, EARTH-ORIENTED PLATFORM FOR THE TESTING OF ADVANCED METEOROLOGICAL SENSOR SYSTEMS AND COLLECTING METEOROLOGICAL DATA. THE POLAR-ORBITING SPACECRAFT CONSISTED OF THREE MAJOR STRUCTURES -- (1) A RING-SHAPED SENSOR MOUNT, (2) SOLAR PADDLES, AND (3) THE CONTROL SYSTEM HOUSING. THE SOLAR PADDLES AND THE CONTROL SYSTEM CONNECTED TO THE SENSOR MOUNT BY A TRUSS STRUCTURE, GIVING THE SATELLITE THE APPEARANCE OF AN OCEAN BUOY. NIMBUS 4 WAS NEARLY 3.7 M TALL, 1.45 M IN DIAMETER AT THE BASE, AND ABOUT 3 M ACROSS WITH SOLAR PADDLES EXTENDED. THE TORUS-SHAPED SENSOR MOUNT, WHICH FORMED THE SATELLITE BASE, HOUSED THE ELECTRONICS EQUIPMENT AND BATTERY MODULES. THE LOWER SURFACE OF THE TORUS RING PROVIDED MOUNTING SPACE FOR SENSORS AND TELEMETRY ANTENNAS. AN H-FRAME STRUCTURE MOUNTED WITHIN THE CENTER OF THE TORUS PROVIDED SUPPORT FOR THE LARGER EXPERIMENTS AND TAPE RECORDERS. MOUNTED ON THE CONTROL SYSTEM HOUSING, WHICH WAS ON TOP OF THE SPACECRAFT, WERE SUN SENSORS, HORIZON SCANNERS, GAS NOZZLES FOR ATTITUDE CONTROL, AND A COMMAND ANTENNA. USE OF AN ADVANCED ATTITUDE CONTROL SUBSYSTEM PERMITTED THE SPACECRAFT'S ORIENTATION TO BE CONTROLLED TO WITHIN PLUS OR MINUS 1 DEG FOR ALL THREE AXES (PITCH, ROLL, AND YAW). PRIMARY EXPERIMENTS CONSISTED OF (1) AN IMAGE DISSECTOR CAMERA SYSTEM (IDCS) FOR PROVIDING DAYTIME CLOUDCOVER PICTURES BOTH IN REAL-TIME AND RECORDED MODES, (2) A TEMPERATURE-HUMIDITY INFRARED RADIOMETER (THIR) FOR MEASURING DAYTIME AND NIGHTTIME SURFACE AND CLOUDTOP TEMPERATURES AS WELL AS THE WATER VAPOR CONTENT OF THE UPPER ATMOSPHERE, (3) AN INFRARED INTERFEROMETER SPECTROMETER (IRIS) FOR MEASURING THE EMISSION SPECTRA OF THE EARTH/ATMOSPHERE SYSTEM, (4) A SATELLITE INFRARED SPECTROMETER (SIRS) FOR DETERMINING THE VERTICAL PROFILES OF TEMPERATURE AND WATER VAPOR IN THE ATMOSPHERE, (5) A MONITOR OF ULTRAVIOLET SOLAR ENERGY (MUSE) FOR DETECTING SOLAR UV RADIATION, (6) A BACKSCATTER ULTRAVIOLET (BUV) FOR MONITORING THE VERTICAL DISTRIBUTION AND TOTAL AMOUNT OF ATMOSPHERIC OZONE ON A GLOBAL SCALE, (7) A FILTER WEDGE SPECTROMETER (FWS) FOR ACCURATE MEASUREMENT OF IR RADIANCE AS A FUNCTION OF WAVELENGTH FROM THE EARTH/ATMOSPHERE SYSTEM, (8) A SELECTIVE CHOPPER RADIOMETER (SCR) FOR DETERMINING THE TEMPERATURES OF SIX SUCCESSIVE 10-KM LAYERS IN THE ATMOSPHERE FROM ABSORPTION MEASUREMENTS IN THE 15-MICROMETER CO2 BAND, AND (9) AN INTERROGATION, RECORDING, AND LOCATION SYSTEM (IRLS) FOR LOCATING, INTERROGATING, RECORDING, AND RETRANSMITTING METEOROLOGICAL AND GEOPHYSICAL DATA FROM REMOTE COLLECTION STATIONS.

----- NIMBUS 4, HEATH-----

INVESTIGATION NAME- BACKSCATTER ULTRAVIOLET (BUV) SPECTROMETER

NSSDC ID- 70-025A-05 INVESTIGATIVE PROGRAM CODE EB
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - D.F. HEATH NASA-GSFC
OI - J.V. DAVE IBM CORPORATION
OI - A.J. KRUEGER NASA-GSFC
OI - C.L. MATEER ENVIRONMENT CANADA

BRIEF DESCRIPTION

THE NIMBUS 4 BACKSCATTER ULTRAVIOLET (BUV) SPECTROMETER EXPERIMENT WAS DESIGNED TO MONITOR THE VERTICAL DISTRIBUTION AND TOTAL AMOUNT OF ATMOSPHERIC OZONE ON A GLOBAL SCALE BY MEASURING THE INTENSITY OF UV RADIATION BACKSCATTERED BY THE EARTH/ATMOSPHERE SYSTEM DURING DAY AND NIGHT IN THE 2500- TO 3400-A SPECTRAL BAND. THE PRIMARY INSTRUMENTATION CONSISTED OF A DOUBLE MONOCHROMATOR CONTAINING ALL REFLECTIVE OPTICS AND A PHOTOMULTIPLIER DETECTOR. THE DOUBLE MONOCHROMATOR WAS COMPOSED OF TWO FASTIE-EBERT-TYPE MONOCHROMATORS IN TANDEM. EACH MONOCHROMATOR HAD A 64- BY 64-MM GRATING WITH 2400 LINES PER MM. LIGHT FROM A 0.05-SR SOLID ANGLE (SUBTENDING APPROXIMATELY A 222-KM-SQUARE AREA ON THE EARTH'S SURFACE FROM A SATELLITE HEIGHT OF APPROXIMATELY 1100 KM) ENTERED THE WADIR-POINTING INSTRUMENT THROUGH A DEPOLARIZING FILTER. A MOTOR-DRIVEN CAM STEP ROTATED THE GRATINGS TO MONITOR THE INTENSITY OF 12 OZONE ABSORPTION WAVELENGTHS. THE DETECTOR WAS A PHOTOMULTIPLIER TUBE. FOR BACKGROUND READINGS, A FILTER PHOTOMETER MEASURED THE REFLECTED UV RADIATION IN AN OZONE-FREE ABSORPTION AREA NEAR 3800 A. SIGNALS FROM BOTH UNITS WERE READ BY SEPARATE RANGE-SWITCHING ELECTROMETERS WITH SEVEN RANGES. THE BUV EXPERIMENT CYCLE REQUIRED 6144 S. EACH CYCLE, IN TURN, WAS DIVIDED INTO 192 BUV FRAMES OF 32 S DURATION. CALIBRATION BY ONBOARD LIGHT SOURCES WAS PERFORMED IN 26 OF THE 192 FRAMES. THE OTHER FRAMES WERE USED FOR EXPERIMENTAL DATA. DURING EACH OF THESE DATA FRAMES, THE MONOCHROMATOR MEASURED THE INTENSITY OF THE UV RADIATION IN EACH OF THE 12 WAVELENGTH BANDS WHILE THE PHOTOMETER MEASURED THE UV INTENSITY IN A SINGLE WAVELENGTH BAND. THE DWELL TIME AT EACH WAVELENGTH WAS 1.8 S, AND, DURING THIS INTERVAL, FOUR ANALOG UV INTENSITY MEASUREMENTS WERE TAKEN

AT 400-MS INTERVALS IN ADDITION TO AN INTEGRATED PULSE COUNT MEASUREMENT OF THE UV INTENSITY AND ENERGETIC PARTICLE FLUX. ONCE EACH ORBIT, THE FIELD OF VIEW WAS CHANGED TO MONITOR THE SUN OR MOON DIRECTLY. THE MEASUREMENT RANGE OF THE SIGNAL CURRENT WAS FROM 0.2 TO 3000 MICROAMPS. THE VERTICAL DISTRIBUTION OF OZONE WAS OBTAINED BY MATHEMATICAL INVERSION TECHNIQUES. FOR A COMPLETE DESCRIPTION OF THE UV EXPERIMENT, SEE SECTION 7 IN 'THE NIMBUS IV USER'S GUIDE.'

***** NIMBUS 5*****

SPACECRAFT COMMON NAME- NIMBUS 5
ALTERNATE NAMES- NIMBUS-E, PL-721B
06305

NSSDC ID- 72-097A

LAUNCH DATE- 12/11/72 WEIGHT- 770. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 12/11/72
ORBIT PERIOD- 107.2 MIN INCLINATION- 99.9 DEG
PERIAPSIS- 1089. KM ALT APOAPSIS- 1101. KM ALT

PERSONNEL
SC - R.J. ARNOLD NASA HEADQUARTERS
PM - C.M. MACKENZIE NASA-GSFC
PS - M. TEPPER NASA-GSFC

BRIEF DESCRIPTION

THE NIMBUS 5 R AND D SATELLITE WAS DESIGNED TO SERVE AS A STABILIZED, EARTH-ORIENTED PLATFORM FOR THE TESTING OF ADVANCED METEOROLOGICAL SENSOR SYSTEMS AND COLLECTING METEOROLOGICAL AND GEOLOGICAL DATA ON A GLOBAL SCALE. THE POLAR-ORBITING SPACECRAFT CONSISTED OF THREE MAJOR STRUCTURES: (1) A HOLLOW RING-SHAPED SENSOR MOUNT, (2) SOLAR PADDLES, AND (3) A CONTROL SYSTEM HOUSING. THE SOLAR PADDLES AND CONTROL SYSTEM HOUSING WERE CONNECTED TO THE SENSOR MOUNT BY A TRUSS STRUCTURE, GIVING THE SATELLITE THE APPEARANCE OF AN OCEAN BUOY. NIMBUS 5 WAS NEARLY 3.7 M TALL, 1.5 M IN DIAMETER AT THE BASE, AND ABOUT 3 M WIDE WITH SOLAR PADDLES EXTENDED. THE TORUS-SHAPED SENSOR MOUNT, WHICH FORMED THE SATELLITE BASE, HOUSED THE ELECTRONICS EQUIPMENT AND BATTERY MODULES. THE LOWER SURFACE OF THE TORUS PROVIDED MOUNTING SPACE FOR SENSORS AND ANTENNAS. A BOX-BEAM STRUCTURE MOUNTED WITHIN THE CENTER OF THE TORUS PROVIDED SUPPORT FOR THE LARGER SENSOR EXPERIMENTS. MOUNTED ON THE CONTROL SYSTEM HOUSING, WHICH WAS LOCATED ON TOP OF THE SPACECRAFT, WERE SUN SENSORS, HORIZON SCANNERS, AND A COMMAND ANTENNA. AN ADVANCED ATTITUDE CONTROL SYSTEM PERMITTED THE SPACECRAFT ORIENTATION TO BE CONTROLLED TO WITHIN PLUS OR MINUS 1 DEG IN ALL THREE AXES. PRIMARY EXPERIMENTS INCLUDED (1) A TEMPERATURE/HUMIDITY INFRARED RADIOMETER (THIR) FOR MEASURING DAY AND NIGHT SURFACE AND CLOUDTOP TEMPERATURES, AS WELL AS THE WATER VAPOR CONTENT OF THE UPPER ATMOSPHERE, (2) AN ELECTRICALLY SCANNING MICROWAVE RADIOMETER (ESMR) FOR MAPPING THE THERMAL RADIATION FROM THE EARTH'S SURFACE AND ATMOSPHERE, (3) AN INFRARED TEMPERATURE PROFILE RADIOMETER (ITPR) FOR OBTAINING VERTICAL PROFILES OF TEMPERATURE AND MOISTURE, (4) A MICROWAVE SPECTROMETER (NEMS) FOR DETERMINING TROPOSPHERIC TEMPERATURE PROFILES, ATMOSPHERIC WATER VAPOR ABUNDANCES, AND CLOUD LIQUID WATER CONTENTS, (5) A SELECTIVE CHOPPER RADIOMETER (SCR) FOR OBSERVING THE GLOBAL TEMPERATURE STRUCTURE OF THE ATMOSPHERE, AND (6) A SURFACE COMPOSITION MAPPING RADIOMETER (SCMR) FOR MEASURING THE DIFFERENCES IN THE THERMAL EMISSION CHARACTERISTICS OF THE EARTH'S SURFACE.

----- NIMBUS 5, HOUGHTON-----

INVESTIGATION NAME- SELECTIVE CHOPPER RADIOMETER (SCR)

NSSDC ID- 72-097A-02 INVESTIGATIVE PROGRAM
CODE EB/CO-OP
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL
PI - J.T. HOUGHTON OXFORD U
OI - S.D. SMITH READING U

BRIEF DESCRIPTION

THE NIMBUS 5 SELECTIVE CHOPPER RADIOMETER (SCR) WAS DESIGNED TO (1) OBSERVE THE GLOBAL TEMPERATURE STRUCTURE OF THE ATMOSPHERE UP TO 50 KM IN ALTITUDE, (2) MAKE SUPPORTING OBSERVATIONS OF WATER VAPOR DISTRIBUTION, AND (3) DETERMINE THE DENSITY OF ICE PARTICLES IN CIRRUS CLOUDS. TO ACCOMPLISH THESE OBJECTIVES, THE SCR MEASURED EMITTED RADIATION IN 16 SPECTRAL INTERVALS SEPARATED INTO THE FOLLOWING FOUR GROUPS -- (1) FOUR CO2 CHANNELS BETWEEN 13.8 AND 14.8 MICROMETERS (2) AN IR WINDOW CHANNEL AT 11.1 MICROMETERS AND A WATER VAPOR CHANNEL AT 18.6 MICROMETERS, (3) TWO CHANNELS AT 49.5 AND 133.3 MICROMETERS, AND (4) 2.08, 2.59, 2.65, AND 3.5 MICROMETERS. FROM AN AVERAGE SATELLITE ALTITUDE OF 1100 KM, THE RADIOMETER VIEWED A 48-KM CIRCLE ON THE EARTH'S SURFACE WITH A GROUND RESOLUTION OF ABOUT PLUS OR MINUS 1 DEG C. A SIMILAR EXPERIMENT WAS FLOWN ON NIMBUS 4.

----- NIMBUS 5, STAELIN-----

INVESTIGATION NAME- MICROWAVE SPECTROMETER (NEMS)

NSSDC ID- 72-097A-03 INVESTIGATIVE PROGRAM
CODE EB
INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL
PI - D.H. STAELIN MASS INST OF TECH
OI - F.T. BARATH NASA-JPL
OI - N.E. GAUT ENVIRON RES + TECH INC
OI - P. THADDEUS NASA-GISS
OI - W.B. LENOIR NASA-JSC

BRIEF DESCRIPTION

THE NIMBUS 5 MICROWAVE SPECTROMETER (NEMS) WAS DESIGNED PRIMARILY TO DEMONSTRATE THE CAPABILITIES AND LIMITATIONS OF MICROWAVE SENSORS FOR MEASURING TROPOSPHERIC TEMPERATURE PROFILES, WATER VAPOR ABUNDANCES, CLOUD LIQUID WATER CONTENT, AND EARTH SURFACE TEMPERATURES. A SECONDARY PURPOSE WAS TO OBTAIN SUCH DATA FOR WEATHER PREDICTION PURPOSES. THE NEMS COULD CONTINUOUSLY MONITOR EMITTED THERMAL RADIATION AT WAVELENGTHS OF 11.1, 9.55, 5.58, 5.46, AND 5.10 MM. THE THREE CHANNELS NEAR THE 5-MM OXYGEN ABSORPTION BAND WERE USED PRIMARILY TO DETERMINE THE ATMOSPHERIC TEMPERATURE PROFILE. NEMS WOULD PROVIDE MEASUREMENTS FOR USE IN DERIVING TEMPERATURE PROFILES EVEN IN CLOUDCOVER CONDITIONS THAT NORMALLY RESTRICT THE USEFULNESS OF CONVENTIONAL IR DATA IN SUCH SITUATIONS. THE TWO WATER VAPOR CHANNELS NEAR 10 MM PERMITTED THE WATER VAPOR AND CLOUD LIQUID WATER CONTENT OVER OCEANS TO BE ESTIMATED AND ALSO YIELDED AN ESTIMATED TEMPERATURE ONCE THE SURFACE EMISSIVITY HAD BEEN CALIBRATED BY COMPARISON WITH DIRECT MEASUREMENTS. THE THREE OXYGEN CHANNELS SHARED A COMMON SIGNAL AND REFERENCE ANTENNA. BOTH WATER VAPOR CHANNELS HAD THEIR OWN SIGNAL AND REFERENCE ANTENNAS. FROM AN AVERAGE SATELLITE HEIGHT OF 1100 KM, THE NEMS VIEWED A 180-KM DIAMETER CIRCLE ON THE EARTH'S SURFACE. NEMS DATA WERE RECORDED ON MAGNETIC TAPE FOR SUBSEQUENT PLAYBACK TO A GROUND ACQUISITION STATION.

----- NIMBUS 5, WILHEIT, JR.-----

INVESTIGATION NAME- ELECTRICALLY SCANNING MICROWAVE
RADIOMETER (ESMR)

NSSDC ID- 72-097A-04 INVESTIGATIVE PROGRAM
CODE EB
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL
PI - T.T. WILHEIT, JR. NASA-GSFC
OI - P. GLOERSEN NASA-GSFC

BRIEF DESCRIPTION

THE PRIMARY OBJECTIVES OF THE NIMBUS 5 ELECTRICALLY SCANNING MICROWAVE RADIOMETER (ESMR) WERE (1) TO DERIVE THE LIQUID WATER CONTENT OF CLOUDS FROM BRIGHTNESS TEMPERATURES OVER OCEANS, (2) TO OBSERVE DIFFERENCES BETWEEN SEA ICE AND THE OPEN SEA OVER THE POLAR CAPS, AND (3) TO TEST THE FEASIBILITY OF INFERRING SURFACE COMPOSITION AND SOIL MOISTURE. TO ACCOMPLISH THESE OBJECTIVES, THE ESMR WAS CAPABLE OF CONTINUOUS GLOBAL MAPPING OF THE 1.55-CM (19.36 GHZ) RADIO THERMAL (MICROWAVE) RADIATION EMITTED BY THE EARTH/ATMOSPHERE SYSTEM AND COULD FUNCTION EVEN IN THE PRESENCE OF CLOUD CONDITIONS THAT BLOCK CONVENTIONAL SATELLITE INFRARED SENSORS. A 90- BY 90-CM RADIOMETER ANTENNA SYSTEM, DEPLOYED AFTER LAUNCH, SCANNED THE EARTH SUCCESSIVELY AT VARIOUS ANGLES IN A PLANE PERPENDICULAR TO THE SPACECRAFT ORBITAL TRACK, PRODUCING A BRIGHTNESS TEMPERATURE MAP OF THE SURFACE OF THE EARTH AND ITS ATMOSPHERE. THE SCANNING PROCESS WAS CONTROLLED BY A COMPUTER ON BOARD AND CONSISTED OF 78 SYMMETRICALLY DISTRIBUTED INDEPENDENT SCAN SPOTS EXTENDING 50 DEG TO EITHER SIDE OF NADIR. ANGULAR SEPARATION OF THE SCAN SPOTS ALLOWED FOR AN 8.5 PERCENT OVERLAP BETWEEN VIEW POSITIONS. FROM A MEAN ORBITAL HEIGHT OF 1100 KM, THE RADIOMETER HAD AN ACCURACY OF ABOUT PLUS OR MINUS 1 DEG C WITH A SPATIAL RESOLUTION OF ABOUT 25 KM. THE ESMR DATA WERE STORED ON MAGNETIC TAPE FOR TRANSMISSION TO GROUND ACQUISITION STATIONS.

***** NIMBUS 6*****

SPACECRAFT COMMON NAME- NIMBUS 6
ALTERNATE NAMES- PL-731B, NIMBUS-F
07924

NSSDC ID- 75-052A

LAUNCH DATE- 06/12/75 WEIGHT- 585. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 107.3 MIN
PERIAPSIS- 1093.00 KM ALT

EPOCH DATE- 06/12/75
INCLINATION- 100. DEG
APOAPSIS- 1101.00 KM ALT

PERSONNEL

MG - R.J. ARNOLD
PM - C.M. MACKENZIE
PS - M. TEPPER

NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE NIMBUS 6 R AND D SATELLITE SERVED AS A STABILIZED, EARTH-ORIENTED PLATFORM FOR TESTING ADVANCED SYSTEMS FOR SENSING AND COLLECTING METEOROLOGICAL DATA ON A GLOBAL SCALE. THE POLAR-ORBITING SPACECRAFT CONSISTED OF THREE MAJOR STRUCTURES: (1) A HOLLOW TORUS-SHAPED SENSOR MOUNT, (2) SOLAR PADDLES, AND (3) A CONTROL HOUSING UNIT CONNECTED TO THE SENSOR MOUNT BY A TRIPOD TRUSS STRUCTURE. CONFIGURED SOMEWHAT LIKE AN OCEAN BUOY, NIMBUS 6 WAS NEARLY 3.7 M TALL, 1.5 M IN DIAMETER AT THE BASE, AND ABOUT 3 M WIDE WITH SOLAR PADDLES EXTENDED. THE SENSOR MOUNT THAT FORMED THE SATELLITE BASE HOUSED THE ELECTRONICS EQUIPMENT AND BATTERY MODULES. THE LOWER SURFACE OF THE TORUS PROVIDED MOUNTING SPACE FOR SENSORS AND ANTENNAS. A BOX-BEAM STRUCTURE MOUNTED WITHIN THE CENTER OF THE TORUS SUPPORTED THE LARGER SENSOR EXPERIMENTS. MOUNTED ON THE CONTROL HOUSING UNIT, WHICH WAS LOCATED ON TOP OF THE SPACECRAFT, WERE SUN SENSORS, HORIZON SCANNERS, AND A COMMAND ANTENNA. AN ADVANCED ATTITUDE CONTROL SYSTEM PERMITTED THE SPACECRAFT'S ORIENTATION TO BE CONTROLLED TO WITHIN PLUS OR MINUS 1 DEG IN ALL THREE AXES (PITCH, ROLL, AND YAW). THE NINE EXPERIMENTS SELECTED FOR NIMBUS 6 ARE THE (1) EARTH RADIATION BUDGET (ERB), (2) ELECTRICALLY SCANNING MICROWAVE RADIOMETER (ESMR), (3) HIGH-RESOLUTION INFRARED RADIATION SOUNDER (HIRS), (4) LIMB RADIANCE INVERSION RADIOMETER (LRIR), (5) PRESSURE MODULATED RADIOMETER (PMR), (6) SCANNING MICROWAVE SPECTROMETER (SCAMS), (7) TEMPERATURE/HUMIDITY INFRARED RADIOMETER (THIR), (8) SATELLITE TRACKING AND DATA RELAY EXPERIMENT, AND (9) TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL EXPERIMENT (TWERLE). THIS COMPLEMENT OF ADVANCED SENSORS IS CAPABLE OF (1) MAPPING TROPOSPHERIC TEMPERATURE, WATER VAPOR ABUNDANCE, AND CLOUD WATER CONTENT, (2) PROVIDING VERTICAL PROFILES OF TEMPERATURE, OZONE, AND WATER VAPOR, (3) TRANSMITTING REAL-TIME DATA TO A GEOSTATIONARY SPACECRAFT (ATS 6), AND (4) YIELDING DATA ON THE EARTH'S RADIATION BUDGET.

----- NIMBUS 6, HOUGHTON-----

INVESTIGATION NAME- PRESSURE-MODULATED RADIOMETER (PMR)

NSSDC ID- 75-052A-09

INVESTIGATIVE PROGRAM
CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL

PI - J.T. HOUGHTON
OI - C.D. RODGERS
OI - E.J. WILLIAMSON
OI - G.D. PESKETT
OI - P. CURTIS

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OXFORD U

BRIEF DESCRIPTION

THE NIMBUS 6 PRESSURE MODULATED RADIOMETER (PMR) EXPERIMENT TOOK RADIOMETRIC MEASUREMENTS IN THE 15-MICROMETER CO₂ BAND AT ALTITUDES BETWEEN 45 AND 70 KM ON A GLOBAL SCALE. BY APPROPRIATE MATHEMATICAL RETRIEVAL METHODS, THE TEMPERATURE STRUCTURE OF THE UPPER STRATOSPHERE AND LOWER MESOSPHERE WERE THEN DEDUCED. THE PRESSURE MODULATION TECHNIQUE PERMITTED THE EXTENSION OF SELECTIVE CHOPPING TECHNIQUES TO HIGHER ALTITUDES WHERE THE PRESSURE-BROADENED EMISSION LINES IN THE 15-MICROMETER CO₂ BAND BECAME SO NARROW THAT CONVENTIONAL SPECTROMETERS AND INTERFEROMETERS HAD INSUFFICIENT SPECTRAL RESOLUTION. IN ADDITION TO PRESSURE SCANNING (IN DISCRETE STEPS), THE RADIOMETER ALSO EMPLOYED DOPPLER SCANNING ALONG THE DIRECTION OF FLIGHT. THE PMR COMPRISED TWO SIMILAR RADIOMETER CHANNELS, EACH CONSISTING OF A PLANE SCANNING MIRROR, REFERENCE BLACKBODY, PRESSURE MODULATOR CELL, AND DETECTOR ASSEMBLY. THE PLANE MIRROR WAS GOLD-COATED AND MOUNTED AT 45 DEG ON A 90-DEG STEPPING MOTOR SO THAT THE FIELD OF VIEW OF THE CHANNEL COULD BE DIRECTED TO SPACE OR TO THE INTERNAL REFERENCE BLACKBODY FOR INFLIGHT RANGE AND ZERO CALIBRATION. THE MOTOR WAS MOUNTED ON A PAIR OF FLEXIBLE PIVOTS SO THAT THE MIRROR CAN BE ROTATED THROUGH PLUS OR MINUS 7-1/2 DEG FROM ITS REST POSITION TO GIVE THE REQUIRED DOPPLER SCAN. MAJOR COMPONENTS IN THE PRESSURE MODULATOR CELL WERE A MOVABLE PISTON, A DIAPHRAGM, AND A MAGNETIC DRIVE COIL. THE DETECTOR ASSEMBLY CONSISTED OF A FIELD LENS, A CONDENSING LIGHT PIPE, AND A PYROELECTRIC FLAKE BOLOMETER. EACH RADIOMETER HAD A FIELD OF VIEW THAT WAS 20 DEG WHOLE ANGLE ACROSS THE SPACECRAFT'S LINE OF FLIGHT AND 40 DEG WHOLE ANGLE PARALLEL TO THE LINE OF FLIGHT. THE REDUCED TEMPERATURE VALUES WERE WITHIN PLUS OR MINUS 2 K AT 65 KM AND ABOUT PLUS OR MINUS 0.2 K NEAR 50 KM.

----- NIMBUS 6, JACOBOWITZ-----

INVESTIGATION NAME- EARTH RADIATION BUDGET (ERB)

NSSDC ID- 75-052A-05

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL

PI - H. JACOBOWITZ
OI - A.J. DRUMMOND
OI - I. RUFF
OI - J.R. HICKEY
OI - W.J. SCHOLLES
OI - L.L. STOWE

NOAA-NESS
EPPLEY LAB, INC
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EPPLEY LAB, INC
NOAA-NESS

BRIEF DESCRIPTION

THE NIMBUS 6 EARTH RADIATION BUDGET (ERB) EXPERIMENT MEASURED REFLECTED AND EMITTED TERRESTRIAL RADIATION FLUXES IN CONJUNCTION WITH SOLAR RADIATION. THE RESULTS WERE USED (1) TO DETERMINE THE EARTH RADIATION BUDGET, (2) TO DETERMINE THE ANGULAR DISTRIBUTION OF TERRESTRIAL RADIATION FOR VARIOUS METEOROLOGICAL AND GEOGRAPHIC REGIMES, AND (3) TO CORRELATE MEASUREMENTS MADE USING IDENTICAL BUT INDEPENDENT CHANNELS CALIBRATED TO THE SAME STANDARD. INCOMING SOLAR RADIATION FROM 0.2 TO 50 MICROMETERS WAS NORMALLY MONITORED IN 10 SPECTRAL INTERVALS SEVERAL TIMES EACH DAY AND EVERY ORBIT DURING PERIODS OF SOLAR ACTIVITY. TERRESTRIAL RADIATION MEASUREMENTS WERE TAKEN CONTINUOUSLY IN THE 0.2 AND 4 MICROMETER, 0.7 TO 3 MICROMETER, AND 4 TO 50 MICROMETER INTERVALS. THE MEASUREMENTS WERE TAKEN IN TWO WAYS. FOUR CHANNELS, USING WIDE-ANGLE OPTICS (133.3-DEG FIELD OF VIEW), MEASURED THE TOTAL OUTGOING RADIATION INTEGRATED OVER THE ENTIRE EARTH DISK. THE SECOND SET OF MEASUREMENTS WAS OBTAINED FOR EIGHT HIGH-RESOLUTION SCANNING CHANNELS THAT MEASURED THE TERRESTRIAL RADIATION EMANATING FROM RELATIVELY SMALL AREA OVER A RANGE OF VARIOUS ZENITH AND AZIMUTH ANGLES. THE MULTICHANNEL RADIOMETER EMPLOYED A BI-AXIAL SCANNING MECHANISM WHICH ENABLED MEASUREMENTS TO BE OBTAINED FROM THE FORWARD HORIZON TO THE AFT HORIZON IN A 64-S INTERVAL. EACH AXIS OF THE SCANNING MECHANISM CONTAINED FOUR SHORTWAVE CHANNELS (0.2 TO 4.0 MICROMETER) AND FOUR LONGWAVE CHANNELS (4.0 TO 50 MICROMETER) WITH A 0.25- BY 5.14-DEG FIELD OF VIEW. THE CHANNELS WERE ORIENTED IN A DIRECTIONAL FAN TO COVER 20 DEG TO EACH SIDE OF THE ORBITAL PLANE. THE 64-S SCAN PERIOD ALLOWED AN AREA TO BE MEASURED FROM UP TO 17 DIFFERENT ANGLES AS THE SPACECRAFT PASSED OVERHEAD.

----- NIMBUS 6, JULIAN-----

INVESTIGATION NAME- TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL (TWERLE)

NSSDC ID- 75-052A-01

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL

PI - P. JULIAN
OI - W.W. KELLOGG
OI - V.E. SUOMI
OI - C.R. LAUGHLIN
OI - R.L. TALLEY
OI - W.R. BANDEEN
OI - C.E. COTE

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NASA-GSFC
SIGMA DATA SERV CORP
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE GOALS OF THE NIMBUS 6 TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL EXPERIMENT (TWERLE) WERE CLOSELY ASSOCIATED WITH THE OBJECTIVES OF GARP AND INCLUDED (1) MEASURING UPPER ATMOSPHERIC WINDS OVER REMOTE REGIONS, (2) STUDYING THE RELATIVE AIR MOTION ALONG ISOBARIC SURFACES TO DETERMINE THE RATE OF CONVERSION OF ATMOSPHERIC POTENTIAL ENERGY INTO KINETIC ENERGY, AND (3) PROVIDING DIRECT MEASUREMENTS OF VARIOUS METEOROLOGICAL PARAMETERS THAT CAN SERVE AS REFERENCE POINTS IN ADJUSTING INDIRECT TEMPERATURE SOUNDINGS MADE FROM SATELLITES. THE EXPERIMENT CONSISTED OF TWO BASIC COMPONENTS: (1) APPROXIMATELY 300 CONSTANT LEVEL METEOROLOGICAL BALLOONS TO YIELD MEASUREMENTS OF WINDS, TEMPERATURE, AND PRESSURE IN THE TROPICS AND AT SOUTHERN HEMISPHERE MIDLATITUDES AT 150 MB (ABOUT 13.6-KM ALTITUDE), AND (2) THE NIMBUS 6 RANDOM ACCESS MEASUREMENTS SYSTEM (RAMS) TO PROVIDE DATA COLLECTION AND LOCATION DETERMINATIONS FROM THE BALLOONS. THE 3.5-M-DIAM POLYESTER-MYLAR BALLOONS WERE EQUIPPED WITH A TRANSMITTER PACKAGE, SOLAR POWER SUPPLY, DIGITIZER/MODULATOR, AND SENSORS. THE SENSORS CONSISTED OF A RADIO ALTIMETER HAVING AN ACCURACY OF BETTER THAN PLUS OR MINUS 20 M, A BEAD THERMISTOR MONITORING THE AMBIENT AIR TEMPERATURE TO AN ACCURACY OF PLUS OR MINUS 0.5 DEG C, AND A PRESSURE SENSOR MEASURING THE 150-MB FLIGHT ALTITUDE TO AN ACCURACY OF PLUS OR MINUS 0.5 MB. A MAGNETIC CUTOFF DEVICE WAS ALSO INCLUDED ON EACH BALLOON TO ELIMINATE ANY ACCIDENTAL OVERFLIGHTS INTO REGIONS OF THE NORTHERN HEMISPHERE NORTH OF 20 DEG N LATITUDE. THE RAMS ON BOARD THE SPACECRAFT HAD NO COMMAND OR CONTROL CAPABILITY OVER THE BALLOONS (THE BALLOONS WERE NOT INTERROGATED). IT MERELY DETECTED EACH BALLOON SIGNAL (401.2 MHZ) AND EXTRACTED THE CARRIER FREQUENCY, BALLOON IDENTIFICATION, AND SENSOR DATA.

THIS INFORMATION, ALONG WITH TIME REFERENCES, WAS STORED IN DIGITAL FORM FOR SUBSEQUENT RELAY TO A GROUND ACQUISITION STATION. THE BALLOON'S POSITION AND VELOCITY WERE DERIVED FROM THE RELATIVE MOTION BETWEEN THE PLATFORM AND THE SATELLITE BY MEASURING DOPPLER SHIFTS IN THE CARRIER SIGNAL RECEIVED FROM THE BALLOON. THERE WAS CAPABLE OF A LOCATION ACCURACY OF 5 KM AND A PLATFORM VELOCITY ACCURACY OF 1 M/S.

***** NIMBUS 7*****

SPACECRAFT COMMON NAME- NIMBUS 7
ALTERNATE NAMES- 11080, NIMBUS-G

NSSDC ID- 78-098A

LAUNCH DATE- 10/24/78 WEIGHT- 832. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 10/25/78
ORBIT PERIOD- 104.0 MIN INCLINATION- 99.3 DEG
PERIAPSIS- 938. KM ALT APOAPSIS- 953. KM ALT

PERSONNEL
SC - R.J. ARNOLD NASA HEADQUARTERS
PM - C.M. MACKENZIE NASA-GSFC
PS - M. TEPPER NASA-GSFC

BRIEF DESCRIPTION

THE NIMBUS 7 RESEARCH AND DEVELOPMENT SATELLITE SERVED AS A STABILIZED, EARTH-ORIENTED PLATFORM FOR THE TESTING OF ADVANCED SYSTEMS FOR SENSING AND COLLECTING METEOROLOGICAL DATA ON A GLOBAL SCALE. THE POLAR-ORBITING SPACECRAFT CONSISTED OF THREE MAJOR STRUCTURES: (1) A HOLLOW TORUS-SHAPED SENSOR MOUNT, (2) SOLAR PADDLES, AND (3) A CONTROL HOUSING UNIT THAT IS CONNECTED TO THE SENSOR MOUNT BY A TRIPOD TRUSS STRUCTURE. CONFIGURED SOMEWHAT LIKE AN OCEAN BUOY, NIMBUS 7 IS NEARLY 3.7 M TALL, 1.5 M IN DIAMETER AT THE BASE, AND ABOUT 3 M WIDE WITH SOLAR PADDLES EXTENDED. THE SENSOR MOUNT THAT FORMS THE SATELLITE BASE HOUSED THE ELECTRONICS EQUIPMENT AND BATTERY MODULES. THE LOWER SURFACE OF THE TORUS PROVIDED MOUNTING SPACE FOR SENSORS AND ANTENNAS. A BOX-BEAM STRUCTURE MOUNTED WITHIN THE CENTER OF THE TORUS PROVIDED SUPPORT FOR THE LARGER SENSOR EXPERIMENTS. MOUNTED ON THE CONTROL HOUSING UNIT, WHICH WAS LOCATED ON TOP OF THE SPACECRAFT, WERE SUN SENSORS, HORIZON SCANNERS, AND A COMMAND ANTENNA. AN ADVANCED ATTITUDE CONTROL SYSTEM PERMITTED THE SPACECRAFT'S ORIENTATION TO BE CONTROLLED TO WITHIN PLUS OR MINUS 1 DEG IN ALL THREE AXES (PITCH, ROLL, AND YAW). EIGHT EXPERIMENTS WERE SELECTED: (1) LIMB INFRARED MONITORING OF THE STRATOSPHERE LIMS, (2) STRATOSPHERIC AND MESOSPHERIC SOUNDER SAMS, (3) COASTAL ZONE COLOR SCANNER CZCS, (4) STRATOSPHERIC AEROSOL MEASUREMENT II SAMS II, (5) EARTH RADIATION BUDGET ERB, (6) SCANNING MULTICHANNEL MICROWAVE RADIOMETER SMMR, (7) SOLAR BACKSCATTER UV AND TOTAL OZONE MAPPING SPECTROMETER SBUV/TOMS, AND (8) TEMPERATURE-HUMIDITY INFRARED RADIOMETER THIR. THIS COMPLEMENT OF SENSORS WERE CAPABLE OF OBSERVING SEVERAL PARAMETERS OF IMPORTANCE AT AND BELOW THE MESOSPHERIC LEVELS. A NEW CAPABILITY OF IMPORTANCE WAS DIRECTED TOWARD OBSERVATION OF ATMOSPHERIC AND OCEAN POLLUTANTS. SUFFICIENT RUNTIME WAS PLANNED FOR SEQUENTIAL MAPS (IMAGERY) OF THE PARAMETERS AVAILABLE FOR STUDY.

----- NIMBUS 7, ALLISON-----

INVESTIGATION NAME- TEMPERATURE/HUMIDITY INFRARED RADIOMETER (THIR)

NSSDC ID- 78-098A-10 INVESTIGATIVE PROGRAM
CODE EB
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - L.J. ALLISON NASA-GSFC

BRIEF DESCRIPTION

THE THIR EXPERIMENT OBJECTIVES WERE TO MEASURE THE INFRARED RADIATION FROM THE EARTH IN TWO SPECTRAL BANDS DURING BOTH DAY AND NIGHT PORTIONS OF THE ORBIT TO PROVIDE PICTURES OF THE CLOUD COVER, THREE-DIMENSIONAL MAPPINGS OF THE CLOUD COVER, AND TEMPERATURE MAPPINGS OF THE CLOUDS, LAND AND OCEAN SURFACES, CIRRUS CLOUD CONTENT, AND ATMOSPHERIC CONTAMINATION AND MOISTURE. THE NIMBUS 7 TEMPERATURE-HUMIDITY INFRARED RADIOMETER (THIR) DETECTED EMITTED THERMAL RADIATION IN BOTH THE 10.5- TO 12.5-MICROMETER REGION (IR WINDOW) AND THE 6.5- TO 7.0-MICROMETER REGION (WATER VAPOR). THE WINDOW CHANNEL MEASURED CLOUDTOP TEMPERATURES AND WAS CAPABLE OF PRODUCING HIGH-RESOLUTION PICTURES OF CLOUDCOVER AND THERMAL GRADIENTS ON LAND AND WATER SURFACES IN CLOUD-FREE AREA DURING BOTH THE DAY AND NIGHT PORTIONS OF THE ORBIT. THE OTHER CHANNEL OPERATED TO MAP THE WATER VAPOR DISTRIBUTION IN THE UPPER TROPOSPHERE AND STRATOSPHERE. DATA FROM THESE TWO CHANNELS WERE USED PRIMARILY TO SUPPORT OTHER, MORE SOPHISTICATED, METEOROLOGICAL EXPERIMENTS ONBOARD NIMBUS 7. THE INSTRUMENT CONSISTED OF A 12.7-CM CASSEGRAIN SYSTEM AND SCANNING MIRROR COMMON TO BOTH CHANNELS, A BEAM SPLITTER, FILTERS, AND TWO GERMANIUM-IMMERSED THERMISTOR BOLOMETERS. IN CONTRAST TO TV, NO IMAGE WAS FORMED WITHIN THE

RADIOMETER. INCOMING RADIANT ENERGY WAS COLLECTED BY A FLAT SCANNING MIRROR INCLINED AT 45 DEG TO THE OPTICAL AXIS. THE MIRROR ROTATES THROUGH 360 DEG AT 48 RPM AND SCANNED IN A PLANE NORMAL TO THE SPACECRAFT VELOCITY. THE ENERGY THEN WAS FOCUSED ON A DICHOIC BEAM SPLITTER WHICH DIVIDED THE ENERGY SPECTRALLY AND SPATIALLY. THE TWO CHANNELS OF THIS SENSOR TRANSFORMED THE RECEIVED RADIATION INTO ELECTRIC OUTPUT (VOLTAGES), WHICH WERE RECORDED ON MAGNETIC TAPE FOR SUBSEQUENT PLAYBACK TO A GROUND ACQUISITION STATION.

----- NIMBUS 7, GLOERSEN-----

INVESTIGATION NAME- SCANNING MULTISPECTRAL MICROWAVE RADIOMETER (SMMR)

NSSDC ID- 78-098A-08 INVESTIGATIVE PROGRAM
CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
ATMOSPHERIC PHYSICS
OCEANOGRAPHY

PERSONNEL
TL - P. GLOERSEN NASA-GSFC
TM - R.O. RAMSEIR ENVIRONMENT CANADA
TM - D.H. STAELIN MASS INST OF TECH
TM - W.J. CAMPBELL US GEOLOGICAL SURVEY
TM - D.B. ROSS NOAA-ERL
TM - P. GUDMANNSEN TECH U OF DENMARK
TM - F.T. BARATH NASA-JPL
TM - T.T. WILHEIT, JR. NASA-GSFC

BRIEF DESCRIPTION

THE PRIMARY PURPOSE OF THE SCANNING MULTICHANNEL MICROWAVE RADIOMETER (SMMR) WAS TO OBTAIN AND USE OCEAN MOMENTUM AND ENERGY-TRANSFER PARAMETERS ON A NEARLY ALL-WEATHER OPERATIONAL BASIS. WINDS, WATER VAPOR, LIQUID WATER CONTENT, AND MEAN CLOUD DROPLET SIZE, ALL AT LOW ALTITUDES, WERE PARAMETERS WHICH WERE DERIVED. OCEAN ICE VS WATER WAS ALSO DETERMINED. MICROWAVE BRIGHTNESS TEMPERATURES WERE OBSERVED WITH A 10-CHANNEL (FIVE-FREQUENCY DUAL POLARIZED) SCANNING RADIOMETER OPERATION AT 0.8-, 1.4-, 1.7-, 2.8-, AND 4.6-CM WAVELENGTHS (37, 21, 18, 10.69, 6.633 GHZ). THE ANTENNA WAS A PARABOLIC REFLECTOR OFFSET FROM NADIR BY 0.73 RAD. MOTION OF THE ANTENNA REFLECTOR PROVIDED OBSERVATIONS FROM WITHIN CONICAL VOLUME ALONG THE GROUND TRACK OF THE SPACECRAFT. THE SAME INSTRUMENT WAS ON SEASAT 1.

----- NIMBUS 7, HEATH-----

INVESTIGATION NAME- SOLAR AND BACKSCATTER ULTRAVIOLET/TOTAL OZONE MAPPING SYSTEM (SBUV/TOMS)

NSSDC ID- 78-098A-09 INVESTIGATIVE PROGRAM
CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
SOLAR PHYSICS

PERSONNEL
TL - D.F. HEATH NASA-GSFC
TM - C.L. MATEER ENVIRONMENT CANADA
TM - A.D. BELMONT CONTROL DATA CORP
TM - A.J. MILLER NOAA-NWS
TM - A.E.S. GREEN U OF FLORIDA
TM - D.M. CUNNOLD MASS INST OF TECH
TM - W.L. IMHOFF LOCKHEED PALO ALTO
TM - A.J. KRUEGER NASA-GSFC

BRIEF DESCRIPTION

THE OBJECTIVES OF THE SBUV/TOMS WERE TO DETERMINE THE VERTICAL DISTRIBUTION OF OZONE, MAP THE TOTAL OZONE AND 200-MB HEIGHT FIELDS, AND MONITOR THE INCIDENT SOLAR ULTRAVIOLET (UV) IRRADIANCE AND ULTRAVIOLET RADIATION BACKSCATTERED FROM THE EARTH. THE SBUV SPECTROMETER MEASURED SOLAR UV THAT IS BACKSCATTERED BY THE EARTH'S ATMOSPHERE AT 12 WAVELENGTHS BETWEEN 2500 AND 3300 ANGSTROMS WITH A SPECTRAL BAND PASS OF 10 ANGSTROMS. THE INSTRUMENT FOV OF 0.20 RAD WAS DIRECTED AT THE NADIR. A PARALLEL PHOTOMETER CHANNEL AT 3400 ANGSTROMS MEASURED THE REFLECTIVITY OF THE ATMOSPHERE'S LOWER BOUNDARY IN THE SAME 0.21-RAD FOV. BOTH CHANNELS ALSO VIEWED THE SUN FOR CALIBRATION THROUGH THE USE OF A DIFFUSER PLATE DEPLOYED NEAR THE TERMINATOR. THE CONTRIBUTION FUNCTIONS FOR THE EIGHT SHORTEST WAVELENGTHS WERE CENTERED AT LEVELS RANGING FROM 55 TO 28 KM AND WERE USED TO INFER THE VERTICAL OZONE PROFILE. THE FOUR LONGEST WAVELENGTHS HAD CONTRIBUTION FUNCTIONS IN THE TROPOSPHERE WHICH WERE USED TO COMPUTE THE TOTAL OZONE AMOUNT. THE SBUV SPECTROMETER HAD A SECOND MODE OF OPERATION THAT ALLOWED A CONTINUOUS SPECTRAL SCAN FROM 1600 TO 4000 ANGSTROMS FOR DETAILED EXAMINATION OF THE EXTRATERRESTRIAL SOLAR SPECTRUM AND THEIR TEMPORAL VARIATIONS. THE TOMS SYSTEMS, OPERATING IN PARALLEL WITH THE SBUV, STEP SCANNED ACROSS A 105-DEG FOV NORMAL TO THE ORBITAL TRACK WITH AN FOV OF APPROXIMATELY 0.052 RAD. AT EACH SCAN POSITION THE EARTH RADIANCE WAS MONITORED AT SIX WAVELENGTHS BETWEEN 3100 AND 3800 ANGSTROMS TO INFER THE TOTAL OZONE AMOUNT. THE INSTRUMENT CONSISTED PRINCIPALLY OF THREE EBERT-FASTIE MONOCHROMETERS, TWO OF WHICH WERE OPERATED IN TANDEM FOR STRAY LIGHT REJECTION. TOMS USED THE THIRD MONOCHROMETER, WHICH WAS EQUIPPED WITH A SPATIAL SCAN MECHANISM AT THE ENTRANCE SLIT. THE SIGNAL-TO-NOISE RATIO OF THE SBUV WAS GREATER THAN 5.E3. THE TOMS SIGNAL-TO-NOISE RATIO WAS GREATER THAN 1.E5.

----- NIMBUS 7, HOUGHTON-----

INVESTIGATION NAME- STRATOSPHERIC AND MESOSPHERIC SOUNDER
(SAMS)

NSSDC ID- 78-098A-02

INVESTIGATIVE PROGRAM
CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL

P1 - J.T. HOUGHTON	OXFORD U
O1 - G.D. PESKEY	CLARENDON LAB
O1 - C.D. RODGERS	OXFORD U
O1 - E.J. WILLIAMSON	CLARENDON LAB

BRIEF DESCRIPTION

THE OBJECTIVE OF SAMS WAS TO OBSERVE EMISSION FROM THE LIMB OF THE ATMOSPHERE THROUGH VARIOUS PRESSURE MODULATED RADIOMETERS AND TO DETERMINE TEMPERATURE AND VERTICAL CONCENTRATIONS OF H₂O, N₂O, CH₄, CO, AND NO IN THE STRATOSPHERE AND MESOSPHERE TO APPROXIMATELY 90 KM. MEASUREMENTS OF ZONAL WIND IN THIS REGION WERE ATTEMPTED BY OBSERVING THE DOPPLER SHIFT OF ATMOSPHERIC EMISSION LINES. RADIATION FROM THE LIMB OF THE ATMOSPHERE WAS INCIDENT ON A TELESCOPE OF 15-CM APERTURE. IN FRONT OF THE TELESCOPE A PLANE MIRROR SCANNED THE LIMB, VIEWED SPACE FOR CALIBRATION, AND VIEWED THE ATMOSPHERE OBLIQUELY TO OBTAIN VERTICAL PROFILES. THREE ADJACENT FIELDS OF VIEW, EACH 28 BY 2.8 MRAD (CORRESPONDING TO 100 KM BY 10 KM AT THE LIMB), FOCUSED ONTO A FIELD-SPLITTING MIRROR WHICH DIRECTED RADIATION TO SIX DETECTORS. THE REMAINING DIVISION INTO CHANNELS WAS ACCOMPLISHED THROUGH DICHROIC BEAM SPLITTERS. THERE WERE SEVEN PRESSURE MODULATOR CELLS (PMC), TWO CONTAINING CO₂, THE REMAINDER N₂O, NO, CH₄, CO, H₂O. PRESSURE IN THE CELLS COULD BE VARIED ON COMMAND BY CHANGING THE TEMPERATURE OF A SMALL CONTAINER OF MOLECULAR SIEVE MATERIAL ATTACHED TO EACH PMC. THE SPECTRAL PARAMETERS FOR THE H₂O CHANNEL WERE 2.7 MICROMETERS AND 25 TO 100 MICROMETERS. ALL OTHER CHANNELS LAY WITHIN THE RANGE OF 4.1 TO 15 MICROMETERS. WITHIN THE TELESCOPE, A CHOPPER OPERATING AT 250 HZ ALLOWED MEASUREMENT OF TWO SEPARATE SIGNALS FROM ALL DETECTORS, ONE AT 250 HZ AND ONE AT THE PMC FREQUENCY. COMPARISON OF THESE SIGNALS PERMITTED ELIMINATING EMISSION FROM INTERFERING GASES WITHIN A PARTICULAR SPECTRAL INTERVAL. IN FRONT OF THE CHOPPER A SMALL BLACK BODY AT KNOWN TEMPERATURE COULD BE INTRODUCED FOR CALIBRATION. ACCURATE MEASUREMENT OF THE ATMOSPHERIC PRESSURE AT THE LEVEL BEING VIEWED WAS OBTAINED FROM THE TWO SIGNALS FROM ONE CO₂ CHANNEL.

----- NIMBUS 7, HOVIS-----

INVESTIGATION NAME- COASTAL ZONE COLOR SCANNER

NSSDC ID- 78-098A-03

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

PERSONNEL

TL - W.A. HOVIS	NOAA-NESS
TM - H.L. RICHARD	NASA-GSFC
TM - C.S. YENTSCH	BIGELOW LAB OCEAN SCI
TM - D. CLARK	NOAA-NESS
TM - J.R. APEL	NOAA-PMEL
TM - S.Z. EL-SAYED	TEXAS A&M U
TM - H.R. GORDON	NOAA-PMEL
TM - R.C. WRIGLEY	NASA-ARC
TM - F.P. ANDERSON	NATL RES INST OCEANOGR
TM - R. AUSTIN	SCRIPPS INST OCEANOGR

BRIEF DESCRIPTION

THE COASTAL ZONE COLOR SCANNER EXPERIMENT WAS DESIGNED TO MAP CHLOROPHYLL CONCENTRATION IN WATER, SEDIMENT DISTRIBUTION, GELBSTOFFE CONCENTRATIONS AS A SALINITY INDICATOR, AND TEMPERATURE OF COASTAL WATERS AND OCEAN CURRENTS. REFLECTED SOLAR ENERGY WAS MEASURED IN SIX CHANNELS TO SENSE COLOR CAUSED BY ABSORPTION DUE TO CHLOROPHYLL, SEDIMENTS, AND GELBSTOFFE IN COASTAL WATERS. SPECTRAL BANDS AT 443 AND 670 NANOMETERS CENTER ON THE MOST INTENSE ABSORPTION BANDS OF CHLOROPHYLL, WHILE THE BAND AT 550 NANOMETERS CENTERS ON THE 'HINGE POINT,' THE WAVELENGTH OF MINIMUM ABSORPTION. RATIOS OF MEASURED ENERGIES IN THESE CHANNELS WERE SHOWN TO CLOSELY PARALLEL SURFACE CHLOROPHYLL CONCENTRATIONS. DATA FROM THE SCANNING RADIOMETER WAS PROCESSED, WITH ALGORITHMS DEVELOPED FROM THE FIELD EXPERIMENT DATA, TO PRODUCE MAPS OF CHLOROPHYLL ABSORPTION. THE TEMPERATURE OF COASTAL WATERS AND OCEAN CURRENTS WAS MEASURED IN A SPECTRAL BAND CENTERED AT 11.5 MICROMETERS. OBSERVATIONS WERE ALSO MADE IN TWO OTHER SPECTRAL BANDS, THE FIRST AT 520 NANOMETERS FOR CHLOROPHYLL CORRELATION AND 750 NANOMETERS FOR SURFACE VEGETATION. TO AVOID SUN GLINT, THE SCANNER MIRROR COULD BE TILTED ABOUT THE SENSOR PITCH AXIS ON COMMAND SO THAT THE LINE OF SIGHT OF THE SENSOR WAS MOVED PLUS OR MINUS 0.35 RAD IN STEPS OF 0.035 RAD WITH RESPECT TO NAZIR.

----- NIMBUS 7, JACOBOWITZ-----

INVESTIGATION NAME- EARTH RADIATION BUDGET (ERB)

NSSDC ID- 78-098A-07

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

TL - H. JACOBOWITZ	NOAA-NESS
TM - T.H. VONDERHAAR	COLORADO STATE U
TM - F.B. HOUSE	DREXEL INST OF TECH
TM - K.L. COULSON	U OF CALIF, DAVIS
TM - J.R. HICKEY	EPPLEY LAB, INC
TM - L.L. STOWE	NOAA-NESS
TM - A.P. INGERSOLL	CALIF INST OF TECH
TM - G.L. SMITH	NASA-LARC

BRIEF DESCRIPTION

THE OBJECTIVE OF THE EARTH RADIATION BUDGET (ERB) EXPERIMENT, A CONTINUATION OF NIMBUS 6 ERB, WAS TO DETERMINE, OVER A PERIOD OF A YEAR, THE EARTH RADIATION BUDGET ON BOTH SYNOPSIS AND PLANETARY SCALES BY SIMULTANEOUS MEASUREMENT OF INCOMING SOLAR RADIATION AND OUTGOING EARTH REFLECTED (SHORTWAVE) AND EMITTED (LONGWAVE) RADIATION. BOTH FIXED WIDE-ANGLE SAMPLING OF TERRESTRIAL FLUXES AT THE SATELLITE ALTITUDE AND SCANNED NARROW-ANGLE SAMPLING OF THE RADIANCE COMPONENTS DEPENDENT ON ANGLE WERE USED TO DETERMINE OUTGOING RADIATION (REFLECTED AND EMITTED). THE ERB SUBSYSTEM CONSISTED OF A 22-CHANNEL RADIOMETER CONTAINING SEPARATE SUBASSEMBLIES TO PERFORM THE REQUIRED SOLAR, EARTH-FLUX (WIDE ANGLE), AND SCANNED EARTH RADIANCE NARROW ANGLE MEASUREMENTS. THE SYSTEMS USED OPTICAL FILTERS FOR SPECTRAL DISCRIMINATIONS, AS WELL AS UNCOOLED THERMAL DETECTORS, THERMOPILE DETECTORS IN THE SOLAR AND FIXED-EARTH-FLUX CHANNELS, AND PYROELECTRIC DETECTORS IN THE SCANNING CHANNELS. THE 10 SOLAR CHANNELS VIEWED IN FRONT OF THE OBSERVATORY IN THE X-Y PLANE. THE SOLAR CHANNELS OBTAINED USABLE SOLAR DATA ONLY DURING A PERIOD OF ABOUT 3 MIN IN EACH ORBIT WHEN THE SPACECRAFT WAS OVER THE ANTARCTIC REGION. THEIR FULL RESPONSE FIELD OF VIEW (FOV) WAS 0.18 RAD. THE SOLAR CHANNEL SUBASSEMBLY WERE PIVOTED PLUS OR MINUS 0.35 RAD IN THE X-Y PLANE TO COMPENSATE FOR SUN ANGLE DEVIATION WHEN REQUIRED. THE FOUR EARTH-FLUX CHANNELS WERE MOUNTED SO THEY CAN CONTINUOUSLY VIEW THE TOTAL EARTH DISK AND WERE CONTINUOUSLY SAMPLED AT FOUR PER S. DEMODULATOR OUTPUT SIGNALS WERE INTEGRATED FOR PERIODS OF AT LEAST 3.8 S. THERE WERE EIGHT NARROW FOV CHANNELS (FOUR SHORTWAVE AND FOUR LONGWAVE) MOUNTED IN THE SCANNING HEAD. THE HEAD WAS GIMBAL MOUNTED IN THE RADIOMETER UNIT MAIN FRAME. THE FOV OF THE TELESCOPES WERE ASYMMETRIC (4.4 BY 89.4 MRAD) AND THE FOV OF THE SHORTWAVE AND LONGWAVE CHANNELS WERE COINCIDENT. THE 89.4 MRAD FOV OF THE FOUR PAIR OF CHANNELS WERE NOT CONTIGUOUS, BUT COVER ONLY ALTERNATE 89.4 MRAD ANGULAR INTERVALS ALONG THE HORIZON.

----- NIMBUS 7, MCCORMICK-----

INVESTIGATION NAME- STRATOSPHERIC AEROSOL MEASUREMENT-11
(SAM-11)

NSSDC ID- 78-098A-06

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
UPPER ATMOSPHERE RESEARCH
METEOROLOGY

PERSONNEL

TL - M.P. MCCORMICK	NASA-LARC
TM - T.J. PEPIN	U OF WYOMING
TM - G.W. GRAMS	NATL CTR FOR ATMOS RES
TM - B.M. HERMAN	U OF ARIZONA
TM - P.B. RUSSELL	SRI INTERNATIONAL

BRIEF DESCRIPTION

THE OBJECTIVE OF SAM 11 WAS TO MAP THE CONCENTRATION AND OPTICAL PROPERTIES OF STRATOSPHERIC AEROSOLS AS A FUNCTION OF ALTITUDE, LATITUDE, AND LONGITUDE. WHEN NO CLOUDS WERE PRESENT IN THE INSTRUMENT FIELD OF VIEW (IFOV), THE TROPOSPHERIC AEROSOLS COULD ALSO BE MAPPED. THE INSTRUMENT, BASICALLY A SUN PHOTOMETER, MEASURED THE EXTINCTION OF SOLAR RADIATION AT 1.0-MICROMETER WAVELENGTH DURING SPACECRAFT SUNRISE AND SUNSET. THE PHOTOMETER VIEWED A PORTION OF THE SOLAR DISK WITH A 0.145-MRAD IFOV AND A SAMPLING RATE OF 50 SAMPLES PER SECOND. AS THE SPACECRAFT FIRST VIEWED THE SUNRISE, THE PHOTOMETER-POINTING AXIS WAS DEPRESSED APPROXIMATELY 0.52 RAD WITH RESPECT TO THE SPACECRAFT HORIZONTAL. THE PHOTOMETER CONTINUED LOOKING AT THE SUN UNTIL ITS DEPRESSION ANGLE IS ON THE ORDER OF 0.44 RAD (APPROXIMATELY 1.4 MIN OBSERVING TIME). BEFORE SUNSET, THE PHOTOMETER HEAD ROTATED 3.14 RAD IN AZIMUTH AND VIEWED THE SUN FROM A DEPRESSION OF APPROXIMATELY 0.44 TO 0.52 RAD AS THE SPACECRAFT ORBITED TO THE DARK SIDE OF THE EARTH. FOR THE EXPECTED HIGH NOON ORBIT, LATITUDES OF BETWEEN 1.12 AND 1.40 RAD IN BOTH HEMISPHERES WERE SCANNED FOR 3 MONTHS. THE EXTINCTION MEASUREMENTS WERE INVERTED FOR THE NUMBER-DENSITY TIMES THE AEROSOL SCATTERING CROSS SECTION BY USING THE LAMBERT-BEER LAW AND ASSUMING THE ATMOSPHERE TO BE COMPOSED OF LAYERS. TO DETERMINE THE STRATOSPHERIC AEROSOL OPTICAL PROPERTIES, GROUND-TRUTH IN SITU BALLOON-BORNE AEROSOL MEASUREMENTS WERE ALSO MADE.

----- NIMBUS 7, RUSSELL, 3RD-----

INVESTIGATION NAME- LIMB INFRARED MONITOR OF THE
STRATOSPHERE (LIMS)

NSSDC ID- 78-098A-01

INVESTIGATIVE PROGRAM
CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S)
UPPER ATMOSPHERE RESEARCH
METEOROLOGY

PERSONNEL

TL - J.M. RUSSELL, 3RD
TL - J.C. GILLE
TM - F.B. HOUSE
TM - E.E. REMSBERG
TM - C.B. LOEVY
TM - S.R. DRAYSON
TM - H. FISCHER
TM - W.G. PLANET
TM - A. GIRARD
TM - J.E. HARRIES

NASA-LARC
NATL CTR FOR ATMOS RES
DREXEL INST OF TECH
NASA-LARC
U OF WASHINGTON
U OF MICHIGAN
U OF MUNICH
NOAA-NESS
ONERA
NATL PHYSICAL LAB

BRIEF DESCRIPTION

THE OBJECTIVE OF THE LIMB INFRARED MONITOR OF THE STRATOSPHERE (LIMS) EXPERIMENT WAS TO MAP THE VERTICAL PROFILES OF TEMPERATURE AND THE CONCENTRATION OF OZONE, WATER VAPOR, NITROGEN DIOXIDE, AND NITRIC ACID IN THE LOWER TO MIDDLE STRATOSPHERE RANGE, WITH EXTENSION TO THE STRATOPAUSE FOR WATER VAPOR AND INTO THE LOWER MESOSPHERE FOR TEMPERATURE AND OZONE. THE INSTRUMENT HAD A SIX-CHANNEL INFRARED (IR) RADIOMETER THAT INCORPORATED HG-CD-TE DETECTORS COOLED BY A TWO-STAGE SOLID CRYOGEN COOLER. THE RADIOMETER MAPPED VERTICAL PROFILES OF THERMAL IR EMISSION COMING FROM THE HORIZON IN SIX BANDS (6.2, 9.5, 11.3, 14.9, AND 15.2 MICROMETERS) OF THE ATMOSPHERIC CONSTITUENTS OF INTEREST. TWO OF THE CHANNELS WERE USED TO DETERMINE RADIANCE PROFILES OF EMISSION BY CO₂. THESE PROFILES WERE MATHEMATICALLY INVERTED TO OBTAIN TEMPERATURE VERSUS PRESSURE. THE INFERRED TEMPERATURE PROFILE, TOGETHER WITH RADIANCE PROFILES IN THE OTHER SPECTRAL BANDS, WERE THEN USED TO INFER THE VERTICAL DISTRIBUTION OF TRACE CONSTITUENTS. THE TEMPERATURE WAS DETERMINED TO AN ACCURACY OF ABOUT 1.5 K. CONSTITUENT CONCENTRATIONS WERE DETERMINED WITH AN ACCURACY OF ABOUT 20 PERCENT, WITH THE EXCEPTION OF NO₂ WHICH WAS DETERMINED TO WITHIN ABOUT 50 PERCENT. INSTANTANEOUS VERTICAL FIELD-OF-VIEW AT THE HORIZON WAS 2 KM FOR THE TEMPERATURE, OZONE, AND NITRIC ACID CHANNELS AND 4 KM FOR THE NO₂ AND WATER VAPOR CHANNELS.

***** NOAA 4*****

SPACECRAFT COMMON NAME- NOAA 4
ALTERNATE NAMES- ITOS-G, 07529

NSSDC ID- 74-089A

LAUNCH DATE- 11/15/74 WEIGHT- 339.7 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY

UNITED STATES NOAA-NESS
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC EPOCH DATE- 11/16/74
ORBIT PERIOD- 114.9 MIN INCLINATION- 101.7 DEG
PERIAPSIS- 1443.0 KM ALT APOAPSIS- 1457.0 KM ALT

PERSONNEL

MG - M.L. GARBACZ NASA HEADQUARTERS
PM - G.A. BRANCHFLOWER NASA-GSFC
PM - A. BUTERA NOAA-NESS
PS - I.L. GOLDBERG NASA-GSFC

BRIEF DESCRIPTION

NOAA 4 (ITOS-G) WAS ONE IN A SERIES OF IMPROVED TIROS-M SATELLITES LAUNCHED WITH NEW METEOROLOGICAL SENSORS ON BOARD TO EXPAND THE OPERATIONAL CAPABILITY OF THE ITOS (NOAA) SYSTEM. THE PRIMARY OBJECTIVE OF THE ITOS-G METEOROLOGICAL SATELLITE WAS TO PROVIDE GLOBAL DAYTIME AND NIGHTTIME DIRECT READOUT CLOUDCOVER DATA ON A DAILY BASIS. THE SUN-SYNCHRONOUS SPACECRAFT ALSO SUPPLIED GLOBAL ATMOSPHERIC TEMPERATURE SOUNDINGS AND VERY HIGH RESOLUTION INFRARED CLOUDCOVER DATA OF SELECTED AREAS IN EITHER A DIRECT READOUT OR A TAPE RECORDER MODE. A SECONDARY OBJECTIVE WAS TO OBTAIN GLOBAL SOLAR PROTON DENSITY DATA ON A ROUTINE DAILY BASIS. THE PRIMARY SENSORS CONSISTED OF A VERY HIGH RESOLUTION RADIOMETER (VHRR), A VERTICAL TEMPERATURE PROFILE RADIOMETER (VTPR), AND A SCANNING RADIOMETER (SR). THE VHRR, VTPR, AND SR WERE MOUNTED ON THE SATELLITE BASEPLATE WITH THEIR OPTICAL AXES DIRECTED VERTICALLY EARTHWARD. THE NEARLY CUBICAL SPACECRAFT MEASURED 1 BY 1 BY 1.2 M. THE SATELLITE WAS EQUIPPED WITH THREE CURVED SOLAR PANELS THAT WERE FOLDED DURING LAUNCH AND DEPLOYED AFTER ORBIT WAS ACHIEVED. EACH PANEL MEASURED OVER 4.2M IN LENGTH WHEN UNFOLDED AND WAS COVERED WITH 3420 SOLAR CELLS MEASURING 2 BY 2 CM. THE ITOS DYNAMICS AND ATTITUDE CONTROL SYSTEM MAINTAINED DESIRED SPACECRAFT ORIENTATION THROUGH GYROSCOPIC PRINCIPLES INCORPORATED INTO THE SATELLITE DESIGN. EARTH ORIENTATION OF THE SATELLITE BODY WAS MAINTAINED BY TAKING ADVANTAGE OF THE PRECESSION INDUCED FROM A MOMENTUM FLYWHEEL SO THAT THE SATELLITE BODY PRECESSION RATE OF ONE REVOLUTION PER ORBIT

PROVIDED THE DESIRED 'EARTH LOOKING' ATTITUDE. MINOR ADJUSTMENTS IN ATTITUDE AND ORIENTATION WERE MADE BY MEANS OF MAGNETIC COILS- AND BY VARYING THE SPEED OF THE MOMENTUM FLYWHEEL.

----- NOAA 4, NESS STAFF-----

INVESTIGATION NAME- SCANNING RADIOMETER (SR)

NSSDC ID- 74-089A-02

INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL

PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE ITOS-G SCANNING RADIOMETER (SR) SUBSYSTEM CONSISTED OF TWO SCANNING RADIOMETERS, A DUAL SR PROCESSOR, AND TWO SR RECORDERS. THIS SUBSYSTEM PERMITTED THE DETERMINATION OF SURFACE TEMPERATURES OF THE GROUND, THE SEA, OR CLOUD TOPS VIEWED BY THE RADIOMETER. THE RADIOMETER MEASURED REFLECTED RADIATION FROM THE EARTH/ATMOSPHERE SYSTEM IN THE 0.52- TO 0.73-MICROMETER BAND DURING THE DAY AND EMITTED RADIATION FROM THE EARTH AND ITS ATMOSPHERE IN THE 10.5- TO 12.5-MICROMETER REGION DURING THE DAY AND NIGHT. UNLIKE A CAMERA, THE SR DID NOT TAKE A PICTURE, BUT INSTEAD FORMED AN IMAGE USING A CONTINUOUSLY ROTATING MIRROR. THE MIRROR SCANNED THE EARTH'S SURFACE PERPENDICULAR TO THE SATELLITE'S ORBITAL PATH AT A RATE OF 48 RPM. AS THE SATELLITE PROGRESSED ALONG ITS ORBITAL PATH, EACH ROTATION OF THE MIRROR PROVIDED ONE SCAN LINE OF PICTURE. RADIATION COLLECTED BY THE MIRROR WAS PASSED THROUGH A BEAM SPLITTER AND SPECTRAL FILTER TO PRODUCE THE DESIRED SPECTRAL SEPARATION. UP TO TWO FULL ORBITS OF DATA (145 MIN) CAN BE STORED ON MAGNETIC TAPE FOR SUBSEQUENT TRANSMISSION (1697.5 MHZ) TO AN ACQUISITION STATION. THE DATA WERE ALSO TRANSMITTED IN REAL TIME TO LOCAL APT STATIONS. ONCE THE SIGNAL WAS RECEIVED BY THE GROUND STATION, A CONTINUOUS PICTURE WAS FORMED BY USING A FACSIMILE RECORDER WHOSE SCAN WAS IN PHASE WITH THE SATELLITE'S FORWARD MOTION. FROM A PLANNED ALTITUDE OF 1460 KM, THE RADIOMETER HAD A GROUND RESOLUTION OF APPROXIMATELY 4 KM AT NADIR AND WAS CAPABLE OF YIELDING RADIANCE TEMPERATURES BETWEEN 185 AND 330 K TO AN ACCURACY OF +4 AND -1 K, RESPECTIVELY. ALL OPERATIONAL DATA FROM THIS EXPERIMENT WERE HANDLED BY NOAA AND EVENTUALLY ARCHIVED AT THE NATIONAL CLIMATIC CENTER, ASHVILLE, NORTH CAROLINA. IDENTICAL EXPERIMENTS WERE FLOWN ON ITOS-D, -E, AND -F.

----- NOAA 4, WILLIAMS-----

INVESTIGATION NAME- SOLAR PROTON MONITOR

NSSDC ID- 74-089A-01

INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS NOAA-ERL
OI - H.H. SAUER NOAA-ERL

BRIEF DESCRIPTION

THIS EXPERIMENT CONTINUED THE ITOS SERIES OF JHU/APL EXPERIMENTS, WHICH WERE ALL THE SAME THROUGH ITOS-F. THREE SOLID-STATE DETECTORS MONITOR THE OMNIDIRECTIONAL FLUXES OF SOLAR PROTONS WITH ENERGIES ABOVE 10, 30, AND 60 MEV, RESPECTIVELY. TWO TELESCOPES CONSISTING OF SOLID-STATE DETECTORS EACH MEASURED DIRECTIONAL FLUXES OF PROTONS BETWEEN 0.27 MEV AND 3.2 MEV (IN THREE INTERVALS), PROTONS BETWEEN 3.2 AND 60 MEV, PROTONS ABOVE 60 MEV, AND ALPHA PARTICLES BETWEEN 12.5 AND 32 MEV. IN THE POLAR CAP REGION, WHICH WAS OF THE GREATEST INTEREST, THE TELESCOPES VIEWED PARALLEL TO, AND PERPENDICULAR TO, THE LOCAL MAGNETIC FIELD DIRECTION. AN ADDITIONAL SOLID-STATE DETECTOR MEASURED DIRECTIONAL FLUXES OF ELECTRONS OF ENERGIES GREATER THAN 140 KEV. THIS DETECTOR LOOKED IN A DIRECTION PERPENDICULAR TO THE ORBIT PLANE.

***** NOAA 5*****

SPACECRAFT COMMON NAME- NOAA 5
ALTERNATE NAMES- ITOS-H, 09057

NSSDC ID- 76-077A

LAUNCH DATE- 07/29/76 WEIGHT- 336. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY

UNITED STATES NOAA-NESS
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 116.2 MIN
PERIAPSIS- 1502. KM ALT

EPOCH DATE- 07/30/76
INCLINATION- 102.1 DEG
APOAPSIS- 1520. KM ALT

PERSONNEL

MG - M.L. GARBACZ
PM - A. BUTERA
PM - G.A. BRANCHFLOWER
PS - I.L. GOLDBERG

NASA HEADQUARTERS
NOAA-NESS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

NOAA 5 WAS ONE IN A SERIES OF IMPROVED TIROS-M TYPE SATELLITES LAUNCHED WITH NEW METEOROLOGICAL SENSORS ON BOARD TO EXPAND THE OPERATIONAL CAPABILITY OF THE ITOS (NOAA) SYSTEM. THE PRIMARY OBJECTIVES OF THE NOAA 5 (ITOS-H) METEOROLOGICAL SATELLITE WERE TO PROVIDE GLOBAL DAYTIME AND NIGHT TIME DIRECT READOUT CLOUDCOVER DATA ON A DAILY BASIS. THE SUN-SYNCHRONOUS SPACECRAFT WAS CAPABLE OF SUPPLYING GLOBAL ATMOSPHERIC TEMPERATURE SOUNDINGS AND VERY HIGH RESOLUTION INFRARED CLOUDCOVER DATA OF SELECTED AREAS IN EITHER A DIRECT READOUT OR A TAPE RECORDER MODE. A SECONDARY OBJECTIVE WAS TO OBTAIN GLOBAL SOLAR PROTON DENSITY DATA ON A ROUTINE DAILY BASIS. THE PRIMARY SENSORS CONSISTED OF A VERY HIGH RESOLUTION RADIOMETER (VHRR), A VERTICAL TEMPERATURE PROFILE RADIOMETER (VTPR), AND A SCANNING RADIOMETER (SR). THE VHRR, VTPR, AND SR WERE MOUNTED ON THE SATELLITE BASEPLATE WITH THEIR OPTICAL AXES DIRECTED VERTICALLY EARTHWARD. THE NEARLY CUBICAL SPACECRAFT MEASURED 1 X 1 X 1.2 M. THE SATELLITE WAS EQUIPPED WITH THREE CURVED SOLAR PANELS THAT WERE FOLDED DURING LAUNCH AND DEPLOYED AFTER ORBIT WAS ACHIEVED. EACH PANEL MEASURED OVER 4.2 M IN LENGTH WHEN UNFOLDED AND WAS COVERED WITH 3420 SOLAR CELLS, EACH MEASURING 2 X 2 CM. THE ITOS DYNAMICS AND ATTITUDE CONTROL SYSTEM MAINTAINED DESIRED SPACECRAFT ORIENTATION THROUGH GYROSCOPIC PRINCIPLES INCORPORATED INTO THE SATELLITE DESIGN. EARTH ORIENTATION OF THE SATELLITE BODY WAS MAINTAINED BY TAKING ADVANTAGE OF THE PRECESSION INDUCED FROM A MOMENTUM FLYWHEEL SO THAT THE SATELLITE BODY PRECESSION RATE OF ONE REVOLUTION PER ORBIT PROVIDED THE DESIRED 'EARTH LOOKING' ATTITUDE. MINOR ADJUSTMENTS IN ATTITUDE AND ORIENTATION WERE MADE BY MEANS OF MAGNETIC COILS AND BY VARYING THE SPEED OF THE MOMENTUM FLYWHEEL. THE SATELLITE WAS PLACED IN A SUN-SYNCHRONOUS ORBIT WITH EQUATORIAL CROSSING OF THE ASCENDING NODE NEAR 0830 A.M. LOCAL TIME.

----- NOAA 5, NESS STAFF-----

INVESTIGATION NAME- VERY HIGH RESOLUTION RADIOMETER (VHRR)

NSSDC ID- 76-077A-01 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - NESS STAFF

NOAA-NESS

BRIEF DESCRIPTION

THE NOAA 5 VERY HIGH RESOLUTION RADIOMETER (VHRR) WAS CAPABLE OF PROVIDING GLOBAL DAYTIME AND NIGHTTIME EARTH CLOUDCOVER PICTURES ON A REGULAR DAILY BASIS FOR USE IN WEATHER ANALYSIS AND FORECASTING. THE MULTISPECTRAL SCANNING INSTRUMENT OPERATED IN BOTH REAL-TIME AND TAPE RECORDER MODES. THE FOUR-CHANNEL UNIT USED THE FOLLOWING SPECTRAL WAVELENGTHS -- CHANNEL 1 - 0.5 TO 0.7 MICROMETERS (VISIBLE), CHANNEL 2 - 0.75 TO 1.00 MICROMETERS (NEAR IR), CHANNEL 3 - 10.5 TO 12.5 MICROMETERS (IR WINDOW), AND CHANNEL 4 - 6.5 TO 7.0 MICROMETERS (WATER VAPOR). THE VISIBLE, NEAR IR, AND IR WINDOW CHANNELS HAD A GROUND RESOLUTION OF 1 KM. THE RESOLUTION OF THE WATER VAPOR CHANNEL WAS SOMEWHAT LESS -- ABOUT 4 KM AT NADIR. EACH CHANNEL HAD ITS OWN ELECTRONICS PACKAGE CONSISTING OF AN AMPLIFIER, AN ANALOG-TO-DIGITAL CONVERTER, AND OTHER AUXILIARY ELECTRONICS. IDENTICAL EXPERIMENTS WILL BE FLOWN ON ITOS-1 AND -J.

----- NOAA 5, NESS STAFF-----

INVESTIGATION NAME- VERTICAL TEMPERATURE PROFILE RADIOMETER (VTPR)

NSSDC ID- 76-077A-02 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - NESS STAFF

NOAA-NESS

BRIEF DESCRIPTION

THE VERTICAL TEMPERATURE PROFILE RADIOMETER (VTPR) SUBSYSTEM WAS DESIGNED TO MAKE RADIANCE MEASUREMENTS IN THE 15-MICROMETER CO2 BAND THAT PERMIT SOUNDING OF THE VERTICAL TEMPERATURE PROFILE FROM THE EARTH'S SURFACE TO AN ALTITUDE OF 30 KM OVER EVERY PART OF THE EARTH AT LEAST TWICE DAILY. A 12-MICROMETER CLEAR WINDOW RADIANCE MEASUREMENT AND A 19-MICROMETER WATER VAPOR BAND WERE USED IN CONJUNCTION WITH SIX CO2 BAND MEASUREMENTS TO EVALUATE THE AMOUNT OF CLOUDCOVER, AND MEASUREMENTS WERE MADE CONTINUOUSLY BOTH DAY AND NIGHT. THE VTPR DATA WERE RECORDED THROUGHOUT THE ORBIT AND WERE PLAYED BACK UPON COMMAND WHEN THE SATELLITE WAS OVER A COMMAND AND DATA ACQUISITION (CDA) STATION. THE VTPR SUBSYSTEM CONSISTED OF AN OPTICAL SYSTEM, A DETECTOR, AND ASSOCIATED

ELECTRONICS. AS THE SATELLITE PROCEEDED IN ITS ORBIT, THE RADIOMETER SCANNED THE EARTH'S SURFACE PLUS OR MINUS 31.45 DEG FROM NADIR IN 23 DISCRETE STEPS. AT EACH STEP A RADIOMETRIC MEASUREMENT WAS MADE SEQUENTIALLY IN EACH OF THE EIGHT SPECTRAL BANDS. IMAGE MOTION COMPENSATION WAS PROVIDED BY STAGGERING THE FIELD STOPS LOCATED ON THE FILTER WHEEL. THE ASSOCIATED ELECTRONICS PROCESSED THE SEQUENTIAL ANALOG DATA AND CONVERTED IT TO DIGITAL FORMAT FOR FURTHER PROCESSING BY THE DATA COLLECTION PLATFORM (DCP) FOR REAL-TIME TRANSMISSION AND/OR RECORDING.

----- NOAA 5, NESS STAFF-----

INVESTIGATION NAME- SCANNING RADIOMETER (SR)

NSSDC ID- 76-077A-03 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - NESS STAFF

NOAA-NESS

BRIEF DESCRIPTION

THE SCANNING RADIOMETER (SR) SUBSYSTEM WAS A REDUNDANT RADIOMETER AND TAPE RECORDER COMBINATION DESIGNED TO PROVIDE THE FOLLOWING DATA: (1) REAL-TIME DAYLIGHT CLOUD COVER INFORMATION IN THE 0.5- TO 1.0-MICROMETER REGION, TRANSMITTED OVER THE VHF DATA LINK, (2) REAL-TIME DAY AND NIGHT THERMAL RADIATION INFORMATION IN THE 10.5- TO 12.5-MICROMETER REGION TRANSMITTED OVER THE VHF DATA LINK, (3) GLOBAL CLOUD COVER INFORMATION STORED ON RECORDERS AND PLAYED BACK TO COMMAND AND DATA ACQUISITION (CDA) STATIONS VIA THE S-BAND DATA LINK, AND (4) GLOBAL THERMAL RADIATION INFORMATION STORED ON RECORDERS AND PLAYED BACK TO CDA STATIONS VIA THE S-BAND DATA LINK. THE SR SUBSYSTEM ELEMENTS INCLUDED TWO SCANNING RADIOMETERS, A DUAL SR PROCESSOR, AND THREE SR RECORDERS. MAJOR CONTROL AND TIMING FUNCTIONS WERE PROVIDED BY THE SATELLITE'S TIME-BASE AND COMMAND-DISTRIBUTION UNITS. AS THE SATELLITE PROCEEDED IN ITS ORBIT, THE RADIOMETER, ONCE COMMANDED ON, SCANNED THE EARTH'S SURFACE FROM HORIZON TO HORIZON WITH A CONTINUOUSLY ROTATING MIRROR. THE SCAN MIRROR WAS INCLINED BY 45 DEG TO ITS AXIS OF ROTATION, WHICH WAS COINCIDENT WITH THE SATELLITE'S VELOCITY VECTOR. THUS, THE OPTICAL AXIS SCANNED IN A PLANE PERPENDICULAR TO THE SATELLITE'S VELOCITY VECTOR. IN THE TIME REQUIRED FOR ONE COMPLETE MIRROR ROTATION, THE SATELLITE PROGRESSED APPROXIMATELY 7.4 KM ALONG THE ORBIT TRACK. AN ADJACENT AREA WAS THEN SCANNED AND SCANS WERE REPEATED THROUGHOUT THE ORBIT TO GENERATE A CONTINUOUS PICTURE.

----- NOAA 5, WILLIAMS-----

INVESTIGATION NAME- SOLAR PROTON MONITOR (SPM)

NSSDC ID- 76-077A-04 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS
OI - H.H. SAUER

NOAA-ERL
NOAA-ERL

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO CONTINUOUSLY MONITOR DIRECTIONAL FLUXES OF: (1) PROTONS IN FIVE CONTIGUOUS INTERVALS BETWEEN 0.15 AND 40 MEV (INTERVAL THRESHOLDS OF 0.15, 0.30, 0.60, 1.5, AND 6.6 MEV), (2) PROTONS IN THE RANGES 400 TO 600 AND 600 TO 1000 MEV, (3) PROTONS ABOVE 1000 MEV, (4) ALPHA PARTICLES IN FIVE CONTIGUOUS ENERGY INTERVALS BETWEEN 0.6 AND 100 MEV (INTERVAL THRESHOLDS OF 0.60, 0.90, 1.4, 3.5, AND 11 MEV), (5) ALPHA PARTICLES BETWEEN 330 AND 600 MEV, (6) ALPHA PARTICLES ABOVE 600 MEV, AND (7) ELECTRONS ABOVE 250 KEV. OMNIDIRECTIONAL FLUXES OF PROTONS ABOVE 10, 30, AND 60 MEV WERE MONITORED.

***** NOAA 6*****

SPACECRAFT COMMON NAME- NOAA 6
ALTERNATE NAMES- NOAA-A

NSSDC ID- 79-057A

LAUNCH DATE- 06/27/79 WEIGHT- 588.9 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS F

SPONSORING COUNTRY/AGENCY

UNITED STATES
UNITED STATES NOAA-NESS
NASA-OSTA

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC EPOCH DATE- 06/28/79
ORBIT PERIOD- 101.5 MIN INCLINATION- 98.7 DEG
PERIAPSIS- 833. KM ALT APOAPSIS- 833. KM ALT

PERSONNEL
MG - M.L. GARBACZ
PM - G.A. BRANCHFLOWER
PS - A. ARKING

NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

DEVICES UTILIZING A STEP TO PROVIDE A TRAVERSE SCAN WHILE THE ORBITAL MOTION OF THE SATELLITE PROVIDED SCANNING IN THE ORTHOGONAL DIRECTION. SIMILAR EXPERIMENTS WERE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA 6, NESS STAFF-----

INVESTIGATION NAME- DATA COLLECTION SYSTEM

NSSDC ID- 79-057A-03

INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - NESS STAFF

NOAA-NESS

BRIEF DESCRIPTION

THE DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS) ON NOAA 6 WAS DESIGNED TO MEET THE METEOROLOGICAL DATA NEEDS OF THE UNITED STATES AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP). THE SYSTEM RECEIVED LOW DUTY CYCLE TRANSMISSIONS OF METEOROLOGICAL OBSERVATIONS FROM FREE-FLOATING BALLOONS, OCEAN BUOYS, OTHER SATELLITES, AND FIXED GROUND-BASED SENSOR PLATFORMS DISTRIBUTED AROUND THE GLOBE. THESE OBSERVATIONS WERE ORGANIZED ON BOARD THE SPACECRAFT AND RETRANSMITTED WHEN THE SPACECRAFT CAME IN RANGE OF A COMMAND AND DATA ACQUISITION (CDA) STATION. FOR FREE-MOVING BALLOONS, THE DOPPLER FREQUENCY SHIFT OF THE TRANSMITTED SIGNAL WAS OBSERVED TO CALCULATE THE LOCATION OF THE BALLOONS. THE DCS WAS EXPECTED, FOR A MOVING SENSOR PLATFORM, TO HAVE A LOCATION ACCURACY OF 5 TO 8 KM RMS, AND A VELOCITY ACCURACY OF 1 TO 1.6 M/S. THIS SYSTEM HAD THE CAPABILITY OF ACQUIRING DATA FROM UP TO 2000 PLATFORMS PER DAY. IDENTICAL EXPERIMENTS WERE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA 6, WILLIAMS-----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NSSDC ID- 79-057A-04

INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS
OI - H.H. SAUER
OI - C.O. BOSTROM

NOAA-ERL
NOAA-ERL
APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT WAS AN EXTENSION OF THE SOLAR PROTON MONITORING EXPERIMENT FLOWN ON THE TIROS SPACECRAFT SERIES. THE EXPERIMENT PACKAGE CONSISTED OF FOUR DETECTOR SYSTEMS AND A DATA PROCESSING UNIT. THE LOW-ENERGY PROTON ALPHA TELESCOPE (LEPAT) SEPARATELY MEASURED IN FIVE ENERGY RANGES BOTH PROTONS BETWEEN 150 KEV AND 40 MEV AND ALPHA PARTICLES BETWEEN 150 KEV/N AND 25 MEV/N. THERE WERE TWO LEPATS VIEWING IN THE ANTI-SUN AND ANTI-EARTH DIRECTIONS WITH 60-DEG VIEWING CONES. THE PROTON OMNIDIRECTIONAL DETECTOR (POD) MEASURED PROTONS ABOVE 10, 30, AND 60 MEV, ELECTRONS ABOVE 140 KEV, AND PROTONS AND ELECTRONS (INSEPARABLE) ABOVE 750 KEV. THE HIGH-ENERGY PROTON ALPHA TELESCOPE (HEPAT) HAD A 50-DEG VIEWING CONE, VIEW IN THE ANTI-EARTH DIRECTION, AND IT MEASURED PROTONS ABOVE 400 MEV AND PROTONS AND ALPHA PARTICLES ABOVE 600 AND 1000 MEV/N. THE TOTAL ENERGY DETECTOR (TED) MEASURED TOTAL ENERGY ABOVE 1 KEV.

***** OAO 3*****

SPACECRAFT COMMON NAME- OAO 3

ALTERNATE NAMES- PL-701D, OAO-C
COPERNICUS, 06153

NSSDC ID- 72-065A

LAUNCH DATE- 08/21/72

WEIGHT- 2150. KG

LAUNCH SITE- CAPE CANAVERAL, UNITED STATES

LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY

UNITED STATES

NASA-OSS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 99.7 MIN
PERIAPSIS- 739. KM ALT

EPOCH DATE- 08/21/72
INCLINATION- 35.0 DEG
APOAPSIS- 751. KM ALT

PERSONNEL

MG - M.E. McDONALD
SC - N.G. ROMAN
PM - P.J. CORRIGAN
PS - J.E. KUPPERIAN, JR.

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

NOAA 6, A TIROS-N TYPE SPACECRAFT, WAS THE FIRST IN A SERIES OF THIRD-GENERATION, OPERATIONAL METEOROLOGICAL SATELLITES FOR USE IN THE NATIONAL OPERATIONAL ENVIRONMENTAL SATELLITE SUBSYSTEM (NOESS) AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP) DURING 1978-84. THE SATELLITE DESIGN PROVIDED AN ECONOMICAL AND STABLE SUN-SYNCHRONOUS PLATFORM FOR ADVANCED OPERATIONAL INSTRUMENTS TO MEASURE THE EARTH'S ATMOSPHERE, ITS SURFACE AND CLOUD COVER, AND THE NEAR-SPACE ENVIRONMENT. PRIMARY SENSORS INCLUDED AN ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) FOR OBSERVING DAYTIME AND NIGHTTIME GLOBAL CLOUD COVER AND AN OPERATIONAL VERTICAL SOUNDER FOR OBTAINING TEMPERATURE AND WATER VAPOR PROFILES THROUGH THE EARTH'S ATMOSPHERE. SECONDARY EXPERIMENTS CONSISTED OF A SPACE ENVIRONMENT MONITOR (SEM), WHICH MEASURED THE PROTON AND ELECTRON FLUX NEAR THE EARTH, AND A DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS), WHICH PROCESSED AND RELAYED TO CENTRAL DATA ACQUISITION STATIONS THE VARIOUS METEOROLOGICAL DATA RECEIVED FROM FREE-FLOATING BALLOONS AND OCEAN BUOYS DISTRIBUTED AROUND THE GLOBE. THE SATELLITE WAS BASED UPON THE BLOCK 5D SPACECRAFT (DMSP-F1 OR 76-091A) BUS DEVELOPED FOR THE US AIR FORCE, AND WAS CAPABLE OF MAINTAINING AN EARTH-POINTING ACCURACY OF BETTER THAN PLUS OR MINUS 0.1 DEG WITH A MOTION RATE OF LESS THAN 0.035 DEG/S.

----- NOAA 6, NESS STAFF-----

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)

NSSDC ID- 79-057A-01

INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI -

NESS STAFF

NOAA-NESS

BRIEF DESCRIPTION

THE NOAA 6 ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) WAS A FOUR-CHANNEL SCANNING RADIOMETER CAPABLE OF PROVIDING GLOBAL DAYTIME AND NIGHTTIME SEA SURFACE TEMPERATURE, ICE, SNOW, AND CLOUD INFORMATION. THESE DATA WERE OBTAINED ON A DAILY BASIS FOR USE IN WEATHER ANALYSIS AND FORECASTING. THE MULTISPECTRAL RADIOMETER OPERATED IN THE SCANNING MODE AND MEASURED EMITTED AND REFLECTED RADIATION IN THE FOLLOWING SPECTRAL INTERVALS -- CHANNEL 1 (VISIBLE), 0.55 TO 0.9 MICROMETER, CHANNEL 2 (NEAR IR), 0.725 MICROMETER TO DETECTOR CUT OFF AROUND 1.3 MICROMETERS, CHANNEL 3 (IR WINDOW), 10.5 TO 11.5 MICROMETERS, AND CHANNEL 4 (IR WINDOW), 3.55 TO 3.93 MICROMETERS. ALL FOUR CHANNELS HAD A SPATIAL RESOLUTION OF 1.1 KM, AND THE TWO IR WINDOW CHANNELS HAD A THERMAL RESOLUTION OF 0.12 K AT 300 K. THE AVHRR WAS CAPABLE OF OPERATING IN BOTH REAL-TIME OR RECORDED MODES. REAL-TIME OR DIRECT READOUT DATA WERE TRANSMITTED TO GROUND STATIONS BOTH AT LOW (4 KM) RESOLUTION VIA AUTOMATIC PICTURE TRANSMISSION (APT) AND AT HIGH (1 KM) RESOLUTION VIA HIGH RESOLUTION PICTURE TRANSMISSION (HRPT). DATA RECORDED ON BOARD WERE AVAILABLE FOR CENTRAL PROCESSING. THEY INCLUDED GLOBAL AREA COVERAGE (GAC) DATA, HAD A RESOLUTION OF 4 KM, AND LOCAL AREA COVERAGE (LAC) DATA, WHICH CONTAINED DATA FROM SELECTED PORTIONS OF EACH ORBIT WITH A 1 KM RESOLUTION. IDENTICAL EXPERIMENTS WERE FLOWN ON THE OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA 6, NESS STAFF-----

INVESTIGATION NAME- OPERATIONAL VERTICAL SOUNDER

NSSDC ID- 79-057A-02

INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI -

NESS STAFF

NOAA-NESS

BRIEF DESCRIPTION

THE NOAA 6 OPERATIONAL SOUNDER CONSISTED OF THREE INSTRUMENTS DESIGNED TO DETERMINE RADIANCES NEEDED TO CALCULATE TEMPERATURE AND HUMIDITY PROFILES OF THE ATMOSPHERE FROM THE SURFACE TO THE STRATOSPHERE (APPROXIMATELY 1 MB). THE FIRST INSTRUMENT, THE BASIC SOUNDING UNIT (BSU), HAD 14 CHANNELS AND MADE MEASUREMENTS IN THE FOLLOWING SPECTRAL INTERVALS: CHANNEL 1 - THE 3.7-MICROMETER WINDOW REGION, CHANNEL 2 - THE 4.3-MICROMETER CO2 BAND, CHANNEL 3 - THE 9.7-MICROMETER OZONE BAND, CHANNEL 4 - THE 11.1-MICROMETER WINDOW REGION, CHANNELS 5 THROUGH 11 - THE 15-MICROMETER CO2 BAND (13.3, 13.6, 14.0, 14.3, 14.5, 14.75, AND 15.0), AND CHANNELS 12 THROUGH 14 - THE 18-MICROMETER ROTATIONAL WATER VAPOR BANDS (18.8, 23.15, AND 29.4). THE SECOND INSTRUMENT, THE STRATOSPHERIC SOUNDING UNIT, HAD THREE CHANNELS OPERATING AT 14.97 MICROMETERS USING SELECTIVE ABSORPTION BY PASSING THE INCOMING RADIATION THROUGH THREE PRESSURE MODULATED CELLS CONTAINING CO2. THE THIRD INSTRUMENT, THE MICROWAVE SOUNDING UNIT, HAD FOUR CHANNELS OPERATING IN THE 50 TO 60 GHZ OXYGEN BAND (50.3, 53.7, 55.0, AND 57.9) TO OBTAIN TEMPERATURE PROFILES WHICH WERE FREE OF CLOUD INTERFERENCE. THE INSTRUMENTS WERE CROSS-COURSE SCANNING

BRIEF DESCRIPTION

THIS MISSION WAS THE THIRD IN THE OAO PROGRAM AND ITS SECOND SUCCESSFUL SPACECRAFT TO OBSERVE THE CELESTIAL SPHERE FROM ABOVE THE EARTH'S ATMOSPHERE. A UV TELESCOPE WITH A SPECTROMETER MEASURED HIGH-RESOLUTION SPECTRA OF STARS, GALAXIES, AND PLANETS WITH THE MAIN EMPHASIS ON THE DETERMINATION OF INTERSTELLAR ABSORPTION LINES. THREE X-RAY TELESCOPES AND A COLLIMATED, PROPORTIONAL COUNTER PROVIDED MEASUREMENTS OF COSMIC X-RAY SOURCES AND INTERSTELLAR ABSORPTION BETWEEN 1 AND 70 Å. THE OAO-3 SPACECRAFT WAS AN OCTAGONALLY-SHAPED, ALUMINUM STRUCTURE WITH A 1.21-M. HOLLOW, CENTRAL, TUBULAR AREA, WHICH HOUSED THE EXPERIMENT CONTAINER. SOLAR PANELS WERE MOUNTED ON EACH SIDE OF THE SPACECRAFT AT ANGLES OF 34 DEG AND HAD AN AREA OF 38.2 SQ M. A SUN BAFFLE PROTECTED THE EXPERIMENTS AND INCREASED THE LENGTH OF THE SPACECRAFT TO 4.9 M. TWO INERTIAL BALANCE BOOMS, ONE FORWARD AND ONE AFT, EXTENDED APPROXIMATELY 6.8 M. THE SPACECRAFT WAS EQUIPPED WITH AN INTERNAL REFERENCE UNIT (A HIGH-PRECISION, THREE-AXIS GYRO INERTIAL SYSTEM), SUN SENSORS, A MAGNETOMETER, AND STAR TRACKERS, WHICH ENABLED SPACECRAFT POINTING TO BE DETERMINED IN MANY DIFFERENT WAYS. A BORESIGHT STAR TRACKER, SENSITIVE TO SIXTH MAGNITUDE, CONTROLLED PITCH AND YAW TO WITHIN 5 ARC S. IN ADDITION, THE HIGH-RESOLUTION TELESCOPE EXPERIMENT HAD A FINE POINTING CONTROL, WHICH COULD CONTROL THE PITCH AND YAW TO WITHIN ONE TENTH ARC S ON BRIGHT STARS. SPACECRAFT ATTITUDE WAS CONTROLLED BY INERTIA WHEELS AND THRUSTERS. REDUNDANT TRACKING BEACONS FACILITATED GROUND TRACKING OF THE SPACECRAFT. TWO UHF (400.55 MHZ) TRANSMITTERS PROVIDED WIDEBAND TELEMETRY FOR TRANSMITTING DIGITAL DATA TO THE GROUND STATIONS. TWO REDUNDANT VHF (136.26 MHZ) TRANSMITTERS WERE USED IN A NARROW-BAND TELEMETRY LINK USED PRIMARILY FOR TRANSMITTING SPACECRAFT HOUSEKEEPING DATA, ALTHOUGH THEY SERVED AS BACKUPS FOR THE WIDEBAND TELEMETRY SYSTEM. TWO REDUNDANT PAIRS OF VHF COMMAND RECEIVERS WERE CARRIED AS PART OF A COMMAND SYSTEM CAPABLE OF STORING 1280 COMMANDS. DATA WERE STORED ON AN ON-BOARD TAPE RECORDER AND IN CORE STORAGE. AN ON-BOARD PROCESSOR WAS CARRIED THAT MONITORED TELEMETRY DATA, ISSUED COMMANDS, AND WAS PROGRAMMED VIA THE COMMAND RECEIVER UPLINK. GUEST INVESTIGATORS AND THEIR INVESTIGATIONS ARE LISTED IN APPENDIX B.

----- OAO 3, BOYD-----

INVESTIGATION NAME- STELLAR X-RAYS

NSSDC ID- 72-065A-02

INVESTIGATIVE PROGRAM
CODE SC/CO-OPINVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - R.L.F. BOYD	U COLLEGE LONDON
OI - P.W. SANFORD	U COLLEGE LONDON

BRIEF DESCRIPTION

THIS EXPERIMENT USED THREE TELESCOPES AND A COLLIMATED PROPORTIONAL COUNTER TO OBSERVE COSMIC X-RAY SOURCES BETWEEN 1 AND 70 Å. BETWEEN 1 AND 3 Å, A PROPORTIONAL COUNTER LOCATED BEHIND A COLLIMATOR WAS USED IN CONJUNCTION WITH PULSE-SHAPE DISCRIMINATION TO REJECT BACKGROUND COUNTS. FROM 3 TO 9 Å AND 6 TO 18 Å, PROPORTIONAL COUNTERS LOCATED AT THE FOCUS OF TWO GRAZING-INCIDENCE REFLECTING TELESCOPES (5.5 SQ CM AND 12 SQ CM, RESPECTIVELY) WERE USED, WITH AN ANTICOINCIDENCE SCINTILLATOR ALSO EMPLOYED TO REJECT BACKGROUND COSMIC-RAY COUNTS. AN OPEN-CHANNEL MULTIPLIER LOCATED AT THE FOCUS OF A GRAZING-INCIDENCE TELESCOPE (23 SQ CM) WAS USED TO OBSERVE BETWEEN 20 AND 70 Å. DATA FROM THIS EXPERIMENT WERE USED TO DETERMINE THE INTERSTELLAR ABSORPTION OF SOFT X-RAYS.

----- OAO 3, SPITZER-----

INVESTIGATION NAME- HIGH-RESOLUTION TELESCOPES

NSSDC ID- 72-065A-01

INVESTIGATIVE PROGRAM
CODE SCINVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - L. SPITZER	PRINCETON U
OI - J. ROGERSON, JR.	PRINCETON U

BRIEF DESCRIPTION

THE PRIMARY OBJECTIVE OF THIS EXPERIMENT WAS TO MAKE QUANTITATIVE OBSERVATIONS OF INTERSTELLAR ABSORPTION LINES IN THE SPECTRAL REGION 1000 TO 3300 Å. THE SECONDARY OBJECTIVE WAS TO OBSERVE UV SPECTRA OF SELECTED BRIGHTER STARS. THE PRIME OPTICAL SYSTEM WAS AN 80-CM-DIAM CASSEGRAIN TELESCOPE WITH A 16-M FOCAL LENGTH (F/20). THIS TELESCOPE WAS COUPLED TO A PASCHEN-RUNGE SPECTROMETER CAPABLE OF 0.1-Å RESOLUTION IN FIRST ORDER AND 0.05-Å RESOLUTION IN SECOND ORDER. THE PHOTONS WERE DETECTED BY FOUR EMR PHOTOTUBES, EACH EQUIPPED WITH ITS OWN EXIT SLIT, AND MOVABLE IN PAIRS ALONG THE ROWLAND CIRCLE. A GUIDANCE ERROR SENSOR ATTACHED TO THE PRIME OPTICS CONTROLLED THE SPACECRAFT ATTITUDE TO WITHIN 0.1 ARC S. THIS GUIDANCE SYSTEM LOCKED ONTO A STAR AS FAINT AS 7TH MAGNITUDE. THE OVERALL SYSTEM COULD MAKE USEFUL MEASUREMENTS ON O- AND B-TYPE STARS TO 7TH MAGNITUDE.

***** OSO 8*****

SPACECRAFT COMMON NAME- OSO 8

ALTERNATE NAMES- OSO-1, OSO-EYE
7310

NSSDC ID- 75-057A

LAUNCH DATE- 06/21/75

WEIGHT- 4280. KG

LAUNCH SITE- CAPE CANAVERAL, UNITED STATES

LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY

UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC	EPOCH DATE- 06/22/75
ORBIT PERIOD- 95.7 MIN	INCLINATION- 32.9 DEG
PERIAPSIS- 544. KM ALT	APOAISIS- 559. KM ALT

PERSONNEL

MG - M.E. McDONALD	NASA HEADQUARTERS
SC - J.D. BOHLIN	NASA HEADQUARTERS
PM - J.P. CORRIGAN	NASA-GSFC
PS - R. THOMAS	NASA-GSFC

BRIEF DESCRIPTION

THE OBJECTIVES OF THE OSO SATELLITE SERIES WERE TO PERFORM SOLAR PHYSICS EXPERIMENTS ABOVE THE ATMOSPHERE DURING A COMPLETE SOLAR CYCLE AND TO MAP THE ENTIRE CELESTIAL SPHERE FOR DIRECTION AND INTENSITY OF UV LIGHT, X-RAY RADIATION, AND GAMMA RADIATION. THE OSO 8 PLATFORM CONSISTED OF A SAIL SECTION, WHICH POINTED TWO EXPERIMENTS CONTINUALLY TOWARD THE SUN, AND A WHEEL SECTION, WHICH SPUN ABOUT AN AXIS PERPENDICULAR TO THE POINTING DIRECTION OF THE SAIL AND CARRIED FIVE EXPERIMENTS. GAS JETS AND A MAGNETIC TORQUING COIL PERFORMED ATTITUDE ADJUSTMENT. POINTING CONTROL PERMITTED THE POINTED EXPERIMENTS TO SCAN THE REGION OF THE SOLAR DISK IN A 40- BY 40-ARC-MIN TO 60- BY 60-ARC-MIN RASTER PATTERN. IN ADDITION, THE POINTED SECTION WAS CAPABLE OF BEING COMMANDED TO SELECT AND SCAN A 1- BY 1-ARC-MIN OR 5- BY 5-ARC-MIN REGION ANYWHERE ON THE SOLAR DISK. DATA WERE SIMULTANEOUSLY RECORDED ON TAPE AND TRANSMITTED BY PCM/PM TELEMETRY. A COMMAND SYSTEM PROVIDED FOR AT LEAST 512 GROUND-BASED COMMANDS.

----- OSO 8, ACTON-----

INVESTIGATION NAME- MAPPING X-RAY HELIOMETER

NSSDC ID- 75-057A-04

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - L.W. ACTON	LOCKHEED PALO ALTO
OI - J.L. CULHANE	U COLLEGE LONDON
OI - R.C. CATURA	LOCKHEED PALO ALTO

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURED THE LOCATION, SPECTRUM, AND INTENSITY OF MODERATE-ENERGY X RAYS (2 TO 30 KEV) FROM INDIVIDUAL SOLAR ACTIVE REGIONS (INCLUDING FLARING REGIONS) AND FROM EXTRASOLAR X-RAY SOURCES. THE INSTRUMENT CONSISTED OF THREE X-RAY COLLIMATOR-DETECTOR SYSTEMS, A POWER SUPPLY, AND A DATA ACCUMULATION/READOUT SYSTEM. THE COLLIMATORS WERE IDENTICAL BUT ORIENTED DIFFERENTLY AND HAD FIELDS OF VIEW OF 2.1 ARC MIN BY 10 DEG, FWHM. ONE COLLIMATOR WAS ORIENTED SO THAT THE 2.1 ARC MIN FIELD OF VIEW WAS PARALLEL TO THE SPACECRAFT SPIN AXIS; THE OTHER TWO COLLIMATORS WERE INCLINED PLUS AND MINUS 60 DEG RELATIVE TO THE SPIN AXIS. THE DETECTORS WERE PROPORTIONAL COUNTERS OF VARIOUS AREAS AND WINDOW THICKNESSES ALLOWING A WIDE DYNAMIC RANGE OF ACTIVITY TO BE OBSERVED.

----- OSO 8, BARTH-----

INVESTIGATION NAME- HIGH-RESOLUTION ULTRAVIOLET SPECTROMETER
MEASUREMENTS

NSSDC ID- 75-057A-01

INVESTIGATIVE PROGRAM
CODE STINVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - C.A. BARTH	U OF COLORADO
OI - E.C. BRUNER, JR.	LOCKHEED PALO ALTO
OI - R.G. ATHAY	HIGH ALTITUDE OBS

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURED SOLAR ULTRAVIOLET LINES BETWEEN 1050 AND 2300 Å AND THEIR VARIATION WITH TIME AND POSITION ON THE DISK. SPECTROHELIOGRAMS WERE ALSO GENERATED AT SELECTED WAVELENGTHS. THE INSTRUMENT CONSISTED OF AN EXTENDED-FOCAL-LENGTH CASSEGRAIN TELESCOPE, AN EBERT MONOCHROMATOR, AND A SMALL COMPUTER. THE TELESCOPE FOCUSED SUNLIGHT ON THE ENTRANCE SLIT (VARIABLE FROM 1 BY 5 ARC S TO 1 ARC S BY 15 ARC MIN) OF THE MONOCHROMATOR. THE 3600 LINES/MM GRATING IN THE MONOCHROMATOR WAS USED IN SECOND ORDER. THE GRATING DRIVE MECHANISM WAS CAPABLE OF BEING PROGRAMMED TO SCAN

-- (1) THE ENTIRE SPECTRUM, (2) SELECTED PORTIONS OF THE SPECTRUM, OR (3) SELECTED SINGLE WAVELENGTHS. TWO PHOTOMULTIPLIER TUBES, ONE COVERING THE RANGE FROM 1400 TO 2300 Å AND THE OTHER COVERING WAVELENGTHS LESS THAN 1400 Å, DETECTED THE RADIATION. THE SMALL COMPUTER CONTAINED WITHIN THE EXPERIMENT CONTROLLED THE EXPERIMENT AND ALLOWED FLEXIBLE OBSERVING PROGRAMS THROUGH AUTOMATED, DATA-DEPENDENT OBSERVING SEQUENCES.

----- OSO 8, BONNET-----

INVESTIGATION NAME- CHROMOSPHERE FINE-STRUCTURE STUDY

NSSDC ID- 75-057A-02

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - R.M. BONNET	CNRS-SA
OI - P. LEMAIRE	CNRS-LPSP
OI - A. VIDAL-MADJAR	CNRS-SA
OI - J.C. VIAL	CNRS-SA

BRIEF DESCRIPTION

THE EXPERIMENT WAS DESIGNED TO MEASURE SOLAR CHROMOSPHERIC SPATIAL AND WAVELENGTH STRUCTURE FOR THE FOLLOWING SPECTRAL LINES IN THE 1000-Å TO 4000-Å REGION -- LYMAN-ALPHA, LYMAN-BETA, THE H AND K LINES OF MAGNESIUM II, AND THE H AND K LINES OF CALCIUM II. THE INSTRUMENT, WHICH WAS COMPOSED OF A CASSEGRAIN TELESCOPE AND A GRATING SPECTROMETER, WAS CAPABLE OF OPERATING IN TWO MODES -- (1) IT COULD HOLD A FIXED SOLAR LOCATION AND SCAN THE SPECTRAL LINES, (2) IT COULD SIMULTANEOUSLY FIX ON THREE OF THE SIX SPECTRAL LINES AND SCAN A 1-ARC-MIN BY 1-ARC-MIN REGION OF THE SOLAR DISK. THE INSTRUMENT WAS CAPABLE OF ANGULAR RESOLUTIONS FROM 1 BY 1 ARC S TO 1 BY 40 ARC S AND A SPECTRAL RESOLUTION OF 0.02 Å (EXCEPT LYMAN BETA, 0.06Å). INSTRUMENT SEQUENCING WAS CONTROLLED BY GROUND COMMAND ONLY.

----- OSO 8, FROST-----

INVESTIGATION NAME- HIGH-ENERGY CELESTIAL X RAYS

NSSDC ID- 75-057A-07

INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - K.J. FROST	NASA-GSFC
OI - B.R. DENNIS	NASA-GSFC

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT WAS TO MEASURE THE ENERGY SPECTRA OF ALL KNOWN X-RAY SOURCES ABOVE THE INTENSITY THRESHOLD OF 1.E-6 PHOTONS/SQ CM-S-KEV IN THE ENERGY REGION .01 TO 1 MEV. THE INSTRUMENT CONSISTED OF 57-SQ-CM CSI (SODIUM) SCINTILLATION CRYSTALS SURROUNDED BY A HONEYCOMB-TYPE CSI (SODIUM) ANTICINCIDENCE COLLIMATOR, THAT PROVIDED AN ACCEPTANCE ANGLE OF 6.30 DEG FROM THE VIEWING AXIS. THE INSTRUMENT WAS MOUNTED ON THE OSO WHEEL SECTION NEARLY PARALLEL TO THE SATELLITE SPIN AXIS.

----- OSO 8, KRAUSHAAR-----

INVESTIGATION NAME- SOFT X-RAY BACKGROUND RADIATION INVESTIGATION

NSSDC ID- 75-057A-05

INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - W.L. KRAUSHAAR	U OF WISCONSIN
OI - A.N. BUNNER	U OF WISCONSIN

BRIEF DESCRIPTION

THE EXPERIMENT WAS DESIGNED TO MEASURE GALACTIC LATITUDE DEPENDENCE OF THE X-RAY BACKGROUND RADIATION IN THE 0.15U- TO 45-KEV REGION, EMPHASIZING THE SOFT X-RAY PORTION. TWO SETS OF THREE PROPORTIONAL COUNTERS MOUNTED ON THE OSO WHEEL VIEWED PARALLEL AND ANTIPARALLEL TO THE WHEEL SPIN DIRECTION THROUGH A 3.5- BY 3.5-DEG FWHM COLLIMATOR. SENSITIVITY WAS EXPECTED TO BE ABOUT 1 PERCENT STATISTICAL ACCURACY NEAR THE GALACTIC POLES, AND ENERGY RESOLUTION WAS PROVIDED BY SELECTED FILTERS. SINCE TWO OF THE COUNTERS HAD THIN POLYCARBONATE WINDOWS THROUGH WHICH METHANE DIFFUSED, A HIGH-PRESSURE METHANE RESERVOIR CARRIED ON THE SPACECRAFT REPLENISHED THOSE COUNTERS THROUGH A GAS FLOW SYSTEM.

----- OSO 8, NOVICK-----

INVESTIGATION NAME- HIGH-SENSITIVITY CRYSTAL SPECTROSCOPY OF STELLAR AND SOLAR X RAYS

NSSDC ID- 75-057A-03

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
SOLAR PHYSICS

PERSONNEL

PI - R. NOVICK	COLUMBIA U
OI - J.R. ANGEL	U OF ARIZONA
OI - P.A. VANDENBOUT	COLUMBIA U
OI - M. WEISSKOPF	COLUMBIA U
OI - R.S. WOLFF	COLUMBIA U

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO MONITOR CONTINUOUSLY THE SUN'S EMISSION IN THE 2-8 KEV RANGE, TO OBTAIN COMPLETE SOLAR SPECTRA OF THE SUN EVERY 10 S DURING FLARES, TO OBTAIN HIGH-RESOLUTION SPECTRA OF MANY CELESTIAL X-RAY OBJECTS, AND TO MEASURE THE POLARIZATION OF X-RAY EMISSION FROM STELLAR SOURCES. THIS INSTRUMENT PACKAGE WAS MOUNTED IN THE WHEEL SECTION. THE SPECTROMETER WAS ORIENTED PERPENDICULAR TO THE SPIN AXIS AND USED LARGE AREA PANELS OF CRYSTALS (1100 SQ CM OF GRAPHITE, 194 SQ CM OF PET) TO REFLECT, VIA BRAGG REFLECTION, MONOCHROMATIC SOLAR X RAYS INTO PROPORTIONAL COUNTER DETECTORS. THE POLARIMETER WAS ORIENTED PARALLEL TO THE SPIN AXIS AND UTILIZED BRAGG ANGLE REFLECTION TO MEASURE POLARIZATION IN X RAYS FROM CELESTIAL SOURCES.

----- OSO 8, SERLEMITSOS-----

INVESTIGATION NAME- COSMIC X-RAY SPECTROSCOPY

NSSDC ID- 75-057A-06

INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - P.J. SERLEMITSOS	NASA-GSFC
OI - E.A. BOLDY	NASA-GSFC
OI - S.S. HOLT	NASA-GSFC
OI - D. SCHWARTZ	SAO

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO DETERMINE THE SPECTRA OF SOURCES AND THE DIFFUSE COSMIC X-RAY BACKGROUND IN THE ENERGY RANGE 2 TO 60 KEV, AND TO MEASURE INTENSITY VARIATIONS AND POSSIBLE EMISSION LINES OF DISCRETE X-RAY SOURCES. PROPORTIONAL CHAMBERS (MULTIANODE PROPORTIONAL COUNTERS) WERE USED AS DETECTORS. ONE DETECTOR COMPLEMENT, CONSISTING OF A PROPANE-NEON-FILLED CHAMBER AND A XENON-METHANE-FILLED CHAMBER (240 SQ CM), WAS LOCATED BEHIND A 5-DEG COLLIMATOR AND ORIENTED PARALLEL TO THE SPACECRAFT SPIN AXIS. A SINGLE-VOLUME, ARGON METHANE-FILLED CHAMBER (75 SQ CM) WAS LOCATED BEHIND A 3-DEG COLLIMATOR AND WAS OFFSET SLIGHTLY FROM ANTI-PARALLEL TO THE SPIN AXIS. A XENON-METHANE-FILLED CHAMBER (270 SQ CM) WAS LOCATED BEHIND A 5-DEG COLLIMATOR AND WAS ORIENTED ANTI-PARALLEL TO THE SPIN AXIS. DATA WERE ACCUMULATED IN A BUFFER MEMORY FOR 1-MIN INTERVALS, THE DATA FROM THE OFFSET DETECTOR BEING SECTORED IN AZIMUTH.

----- OSO 8, WELLER, JR.-----

INVESTIGATION NAME- EUV FROM EARTH AND SPACE

NSSDC ID- 75-057A-08

INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - C.S. WELLER, JR.	US NAVAL RESEARCH LAB
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BRIEF DESCRIPTION

THIS EXPERIMENT, MOUNTED IN THE WHEEL SECTION, OBTAINED SPATIAL AND TEMPORAL MEASUREMENTS OF EXTREME ULTRAVIOLET (EUV) EMISSIONS OF HYDROGEN, HELIUM, AND OXYGEN IN THE EARTH'S ATMOSPHERE AND IN INTERPLANETARY AND GALACTIC SPACE. THREE PHOTOMETERS WERE DESIGNED TO MEASURE EUV RESONANCE RADIATION IN VARIOUS WAVELENGTHS FROM 170 TO 1080 Å AND IN PORTIONS OF THE 1125- TO 1230-Å BAND. EACH PHOTOMETER CONSISTED OF A CONTINUOUS-CHANNEL ELECTRON MULTIPLIER USED AS A PHOTON DETECTOR, TOGETHER WITH A THIN METAL FILM OR A MAGNESIUM FLUORIDE-OXYGEN CELL TO SERVE AS OPTICAL BANDPASS FILTERS. THERE WERE FOUR SUCH BANDPASS FILTERS -- (1) A THIN FILM OF 1000-Å-THICK ALUMINUM AND 500-Å-THICK CARBON (BANDWIDTH OF 170 TO 440 Å), (2) A THIN FILM OF 1000-Å-THICK ALUMINUM (BANDWIDTH OF 170 TO 800 Å), (3) A THIN FILM OF 1500-Å-THICK INDIUM (BANDWIDTH OF 730 TO 1080 Å), AND (4) A CELL WITH A MAGNESIUM FLUORIDE WINDOW (BANDWIDTH OF 1130 TO 1500 Å). THESE BANDPASS FILTERS WERE MOUNTED ON A WHEEL IN FRONT OF THE PHOTON DETECTORS AND WERE ROTATED AT REGULAR INTERVALS TO CHANGE THE FILTERS. THIS MADE THREE OF THE INDICATED WAVELENGTH RANGES OPERATIONAL AT ANY GIVEN TIME. THE INSTRUMENT WAS MOUNTED WITH THE PHOTOMETER AXES AT A SMALL ANGLE TO THE SATELLITE-SUN LINE AND WITH SUFFICIENT BAFFLING THAT THE PHOTOMETERS WOULD NEVER 'SEE' THE SUN.

***** PIONEER 6*****

SPACECRAFT COMMON NAME- PIONEER 6
ALTERNATE NAMES- PIONEER-A, 01841

NSSDC ID- 65-105A

LAUNCH DATE- 12/16/65 WEIGHT- 146. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC EPOCH DATE- 07/15/75
ORBIT PERIOD- 311.1 DAYS INCLINATION- 0.168 DEG
PERIAPSIS- 0.813 AU RAD APOAPSIS- 0.983 AU RAD

PERSONNEL
MG - F.D. KOCHENDORFER NASA HEADQUARTERS
SC - A.G. OPP NASA HEADQUARTERS
PN - C.F. HALL NASA-ARC
PS - J.H. WOLFE NASA-ARC

BRIEF DESCRIPTION
PIONEER 6 WAS THE FIRST IN A SERIES OF SOLAR-ORBITING, SPIN-STABILIZED, SOLAR-CELL AND BATTERY-POWERED SATELLITES DESIGNED TO OBTAIN MEASUREMENTS ON A CONTINUING BASIS OF INTERPLANETARY PHENOMENA FROM WIDELY SEPARATED POINTS IN SPACE. ITS EXPERIMENTS STUDIED THE POSITIVE IONS AND ELECTRONS IN THE SOLAR WIND, THE INTERPLANETARY ELECTRON DENSITY (RADIO PROPAGATION EXPERIMENT), SOLAR AND GALACTIC COSMIC RAYS, AND THE INTERPLANETARY MAGNETIC FIELD. ITS MAIN ANTENNA WAS A HIGH-GAIN DIRECTIONAL ANTENNA. THE SPACECRAFT WAS SPIN-STABILIZED AT ABOUT 60 RPM, AND THE SPIN AXIS WAS PERPENDICULAR TO THE ECLIPTIC PLANE AND POINTED TOWARD THE SOUTH ECLIPTIC POLE. BY GROUND COMMAND, ONE OF FIVE BIT RATES, ONE OF FOUR DATA FORMATS, AND ONE OF FOUR OPERATING MODES COULD BE SELECTED. THE FIVE BIT RATES WERE 512, 256, 64, 16, AND 8 BPS. THREE OF THE FOUR DATA FORMATS CONTAINED PRIMARILY SCIENTIFIC DATA AND CONSISTED OF 32 SEVEN-BIT WORDS PER FRAME. ONE SCIENTIFIC DATA FORMAT WAS FOR USE AT THE TWO HIGHEST BIT RATES. ANOTHER WAS FOR USE AT THE THREE LOWEST BIT RATES. THE THIRD CONTAINED DATA FROM ONLY THE RADIO PROPAGATION EXPERIMENT. THE FOURTH DATA FORMAT CONTAINED MAINLY ENGINEERING DATA. THE FOUR OPERATING MODES WERE REAL TIME, TELEMETRY STORE, DUTY CYCLE STORE, AND MEMORY READOUT. IN THE REAL-TIME MODE, DATA WERE SAMPLED AND TRANSMITTED DIRECTLY (WITHOUT STORAGE) AS SPECIFIED BY THE DATA FORMAT AND BIT RATE SELECTED. IN THE TELEMETRY STORE MODE, DATA WERE STORED AND TRANSMITTED SIMULTANEOUSLY IN THE FORMAT AND AT THE BIT RATE SELECTED. IN THE DUTY CYCLE STORE MODE, A SINGLE FRAME OF SCIENTIFIC DATA WAS COLLECTED AND STORED AT A RATE OF 512 BPS. THE TIME INTERVAL BETWEEN THE COLLECTION AND STORAGE OF SUCCESSIVE FRAMES COULD BE VARIED BY GROUND COMMAND BETWEEN 2 AND 17 MIN TO PROVIDE PARTIAL DATA COVERAGE FOR PERIODS UP TO 19 H, AS LIMITED BY THE BIT STORAGE CAPACITY. IN THE MEMORY READOUT MODE, DATA WERE READ OUT AT WHATEVER BIT RATE WAS APPROPRIATE TO THE SATELLITE DISTANCE FROM THE EARTH.

----- PIONEER 6, ANDERSON-----

INVESTIGATION NAME- CELESTIAL MECHANICS

NSSDC ID- 65-105A-07 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
CELESTIAL MECHANICS

PERSONNEL
PI - J.D. ANDERSON NASA-JPL

BRIEF DESCRIPTION
THE PURPOSE OF THIS EXPERIMENT WAS TO USE THE TRACKING DATA FROM THE MISSION TO OBTAIN PRIMARY DETERMINATIONS OF THE MASSES OF THE EARTH AND MOON, THE ASTRONOMICAL UNIT, AND THE OSCILLATING ELEMENTS OF THE ORBIT OF THE EARTH. THIS WAS APPROPRIATE BECAUSE OF THE ABSENCE OF MIDCOURSE ORBIT CORRECTIONS AND NEAR-PLANETARY ENCOUNTERS. ALSO, SOLAR RADIATION PRESSURE EFFECTS WERE SMALL. THE EXPERIMENT USED THE ONBOARD RECEIVER AND TRANSMITTER EQUIPMENT IN CONJUNCTION WITH DEEP SPACE STATION EQUIPMENT TO OBTAIN DOPPLER MEASUREMENTS.

----- PIONEER 6, ANDERSON-----

INVESTIGATION NAME- RELATIVITY INVESTIGATION

NSSDC ID- 65-105A-10 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - J.D. ANDERSON NASA-JPL

BRIEF DESCRIPTION

THE PIONEER 6 SPACECRAFT PRESENTED THE FIRST OPPORTUNITY TO INVESTIGATE THE RELATIVISTIC CONTRIBUTION OF THE SUN TO THE DOPPLER SHIFTING OF THE SPACECRAFT TRANSMITTER SIGNAL. THE DOPPLER TRANSPONDER SEGMENT OF THE SPACECRAFT TRANSMITTER WAS TO BE USED FOR THIS PURPOSE. HOWEVER, THE CORONAL NOISE PRODUCED A MUCH LARGER CONTRIBUTION TO THE TRANSMITTER SIGNAL THAN DID THE RELATIVISTIC DOPPLER EFFECT. THUS, ALTHOUGH THE EXPERIMENT FAILED IN ITS PRIMARY PURPOSE, IT DID CONTRIBUTE THE FIRST MEASURE OF THE RELATIVE EFFECT OF CORONAL NOISE ON DOPPLER SHIFTING OF RADIO SIGNALS.

----- PIONEER 6, BRIDGE-----

INVESTIGATION NAME- SOLAR WIND PLASMA FARADAY CUP

NSSDC ID- 65-105A-02 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL
PI - H.S. BRIDGE MASS INST OF TECH
OI - A.J. LAZARUS MASS INST OF TECH
OI - F. SCHERB U OF WISCONSIN

BRIEF DESCRIPTION

A MULTIGRID FARADAY CUP WITH TWO SEMICIRCULAR, COPLANAR COLLECTORS WAS USED TO STUDY SOLAR WIND IONS AND ELECTRONS. THE INSTRUMENT HAD 14 CONTIGUOUS, ENERGY-PER-CHARGE (E/Q) CHANNELS BETWEEN 75 AND 9485 V FOR POSITIVE IONS AND FOUR ENERGY-PER-CHARGE CHANNELS BETWEEN 90 AND 1580 V FOR ELECTRONS. THE INSTRUMENT VIEW AXIS WAS PERPENDICULAR TO THE SPACECRAFT SPIN AXIS AND PARALLEL TO THE ECLIPTIC PLANE. THE LINE SEPARATING THE TWO COLLECTORS LAY IN THE ECLIPTIC PLANE, ENABLING A ROUGH DETERMINATION OF SOLAR WIND BULK FLOW PERPENDICULAR TO THE ECLIPTIC PLANE. DURING EVERY SECOND SPACECRAFT ROTATION AND AT ONE VOLTAGE LEVEL, THE SUM OF THE CURRENTS FROM THE COLLECTORS WAS OBTAINED IN 28 CONTIGUOUS 11.25-DEG ANGULAR SECTORS (FROM -45 DEG TO 270 DEG, WITH 0 DEG BEING THE SPACECRAFT-SUN LINE). THE EIGHT MEASUREMENTS ABOUT THE SUN-EARTH LINE (-45 DEG TO +45 DEG) WERE TELEMETERED, BUT ONLY THE LARGEST MEASUREMENT IN EACH SUCCEEDING 45-DEG INTERVAL (45 DEG TO 270 DEG) WAS TELEMETERED. IN ADDITION, DURING THIS ROTATION, THE CURRENT FROM ONE OF THE COLLECTORS WAS MEASURED IN ALL TWENTY-EIGHT 11.25-DEG SECTORS, AND THE LARGEST WAS IDENTIFIED AND TELEMETERED (BOTH MAGNITUDE AND SECTOR). A COMPLETE SET OF POSITIVE ION MEASUREMENTS AND ONE ENERGY CHANNEL OF ELECTRON MEASUREMENTS WERE COMPLETED EVERY 32 SEC. THE TIME BETWEEN EACH 32-S GROUP OF MEASUREMENTS VARIED WITH THE BIT RATE. FOR A MORE COMPLETE DESCRIPTION, SEE 'J. GEOPHYS. RES.', VOL 71, 3787-3791, AUGUST 1966.

----- PIONEER 6, FAN-----

INVESTIGATION NAME- COSMIC-RAY TELESCOPE

NSSDC ID- 65-105A-03 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL
PI - C.Y. FAN U OF ARIZONA
OI - J.A. SIMPSON U OF CHICAGO
OI - J.E. LAMPORT U OF CHICAGO

BRIEF DESCRIPTION

THIS EXPERIMENT USED A CHARGED PARTICLE TELESCOPE COMPOSED OF FOUR SILICON SOLID-STATE DETECTORS TO STUDY THE ANISOTROPY AND FLUCTUATIONS OF SOLAR PROTONS AND ALPHA PARTICLES. THE PROTON ENERGY RANGES SAMPLED WERE 0.6 TO 13.9 MEV, 13.9 TO 73.2 MEV, 73.2 TO 175 MEV, AND E.G.T. 175 MEV. THE ALPHA PARTICLE ENERGY RANGES SAMPLED WERE 2.4 TO 55.6 MEV, 55.6 TO 293 MEV, AND E.G.T. 294 MEV. THE TIME RESOLUTION RANGED FROM ABOUT ONE MEASUREMENT PER 0.4 S TO ABOUT ONE MEASUREMENT PER 28 S DEPENDING ON THE TELEMETRY BIT RATE. THE DETECTOR WAS MOUNTED SO THAT IT MADE A 360-DEG SCAN IN THE ECLIPTIC PLANE ABOUT ONCE PER SECOND. PULSE HEIGHT ANALYSIS OF DETECTOR D1 OUTPUT (128 CHANNEL) AND D3 OUTPUT (32 CHANNEL) WAS ACCOMPLISHED FOR THE LAST EVENT PRIOR TO EACH TELEMETRY READOUT FOR THE EXPERIMENT. FOR FURTHER DETAILS, SEE FAN ET AL., JGR, 73, 1555, 1968.

----- PIONEER 6, GOLDSTEIN-----

INVESTIGATION NAME- SPECTRAL BROADENING

NSSDC ID- 65-105A-09 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
HIGH ENERGY ASTROPHYSICS
SOLAR PHYSICS

PERSONNEL
PI - R.M. GOLDSTEIN

NASA-JPL

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT WAS TO EXPLORE THE STRUCTURE OF THE CORONA AND SOLAR EVENTS BY USING TELEMETRY SIGNALS AND THEIR SPECTRAL LINE BROADENING AS THEY PASSED THROUGH THE SOLAR CORONA AND APPROACHED THE SUN'S LIMB DURING SUPERIOR CONJUNCTION OCCULTATION. NORMALLY THE SIGNALS CONSISTED OF VERY NARROW-BAND (MONOCHROMATIC) AND SPECTRALLY PURE CARRIER WAVES AND A SET OF MODULATION SIDE BANDS. THE CARRIER WAVE FREQUENCY WAS NOMINALLY 2295 HZ AND THE SIDE BANDS WERE SEPARATED BY MULTIPLES OF 2 KHZ AND WERE REMOVED BY FILTERING. DATA WAS COLLECTED IN THE FORM OF SPECTOGRAMS, EACH CONSISTING OF A 15-MIN OBSERVATION. THE THREE PARAMETERS OF INTEREST WERE THE SIGNAL POWER, CENTER FREQUENCY, AND BANDWIDTH. THE INSTRUMENTATION CONSISTED OF THE SPACECRAFT S-BAND TELEMETRY SYSTEM AND JPL'S 64-M RECEIVER ANTENNA, WHICH HAD A BEAMWIDTH OF ONLY 0.14 DEG AT 2300 MHZ (S-BAND). IT WAS EXTREMELY SENSITIVE, HAVING AN EQUIVALENT NOISE TEMPERATURE OF ONLY 25 K. THE RECEIVER WAS TUNED CONTINUOUSLY ACCORDING TO AN EPHEMERIS, WITH AN ACCURACY TO 0.05 HZ. THIS WAS NECESSARY IN ORDER TO COMPENSATE FOR FREQUENCY SHIFTS RESULTING FROM ORBITAL VELOCITIES OF THE SPACECRAFT AND EARTH'S SPIN. THE FREQUENCY BANDWIDTH WAS 100 HZ FOR EACH SPECTRUM, DEFINED BY A FILTER AT THE LAST STAGE OF THE RECEIVER. FREQUENCY RESOLUTION WAS 0.2 HZ OVER THE 100-HZ BANDWIDTH.

----- PIONEER 6, MCCracken-----

INVESTIGATION NAME- COSMIC-RAY ANISOTROPY

NSSDC ID- 65-105A-05

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - K.G. MCCracken
OI - W.C. BARTLEY
OI - U.R. RAO

CSIRO
NATL ACADEMY OF SCI
ISSP, VSSC

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED PRIMARILY TO MEASURE THE DIRECTIONAL CHARACTERISTICS OF GALACTIC AND SOLAR COSMIC-RAY FLUXES. THE PARTICLE DETECTOR WAS A CSI (TL) SCINTILLATOR CRYSTAL THAT WAS SET INTO AN ANTICOINCIDENCE PLASTIC SCINTILLATOR COLLIMATOR CUP. SEPARATE PHOTOMULTIPLIER TUBES VIEWED THE TWO SCINTILLATORS. PULSES FROM THE CSI CRYSTAL UNACCOMPANIED BY PULSES FROM THE PLASTIC SCINTILLATOR WERE SORTED BY A THREE-WINDOW PULSE HEIGHT ANALYZER, THE WINDOWS CORRESPONDING TO ENERGY DEPOSITIONS OF 7.4 TO 44.0, 44.0 TO 77.1, AND 123.8 TO 303.8 MEV. COUNTS IN THE TWO LOWER ENERGY WINDOWS WERE DUE MAINLY TO PROTONS WITH THE WINDOW ENERGIES, WHILE ONLY PARTICLES OF 2 GREATER THAN OR EQUAL TO 2 CONTRIBUTED TO THE HIGHEST ENERGY WINDOW COUNT RATE. (PROTONS ABOVE 90 MEV GAVE ANTICOINCIDENCE PULSES.) FOR EACH ENERGY WINDOW, COUNTS WERE SEPARATELY ACCUMULATED IN EACH OF FOUR ANGULAR SECTORS AS THE SPACECRAFT SPUN. EACH ANGULAR SECTOR WAS NORMALLY 89.5 DEG IN WIDTH, WITH THE SUN IN THE MIDDLE OF ONE SECTOR. HOWEVER, WHEN LARGE FLUXES WERE ENCOUNTERED, EACH ANGULAR SECTOR WAS REDUCED TO 11.2 DEG, WITH THE SUN NEAR THE MIDPOINT BETWEEN TWO SECTORS. A SPIN-INTEGRATED (ISOTROPIC) MODE, IN WHICH ALL PARTICLES DEPOSITING 7.4 MEV IN THE CSI CRYSTAL (NO ANTICOINCIDENCE REQUIREMENT) WERE COUNTED, WAS ALSO USED. ACCUMULATION TIMES FOR EACH OF THE 12 DIRECTIONAL MODES AND FOR THE OMNIDIRECTIONAL MODE VARIED BETWEEN 14 S AND 112 S (SPACECRAFT SPIN PERIOD WAS ABOUT 1 S) DEPENDING ON THE TELEMETRY BIT RATE. SEE BARTLEY ET AL., 'REV. SCI. INSTRUM.', 38, 266, 1967, FOR A MORE DETAILED EXPERIMENT DESCRIPTION.

----- PIONEER 6, WOLFE-----

INVESTIGATION NAME- ELECTROSTATIC ANALYZER

NSSDC ID- 65-105A-06

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - J.H. WOLFE

NASA-ARC

BRIEF DESCRIPTION

A QUADRISPHERICAL ELECTROSTATIC ANALYZER WITH EIGHT CONTIGUOUS CURRENT COLLECTORS WAS USED TO STUDY THE DIRECTIONAL INTENSITY OF ELECTRONS AND POSITIVE IONS IN THE SOLAR WIND. IONS WERE DETECTED IN 16 LOGARITHMICALLY EQUISPACED ENERGY-PER-CHARGE (E/Q) STEPS FROM 200 TO 10,000 V. THERE WAS AN ELECTRON MODE OF OPERATION IN WHICH ELECTRONS WERE MEASURED IN EIGHT LOGARITHMICALLY EQUISPACED E/Q STEPS RANGING FROM 1 TO 500 V. THE EIGHT COLLECTORS MEASURED PARTICLES INCIDENT FROM EIGHT DIFFERENT CONTIGUOUS ANGULAR INTERVALS RELATIVE TO THE SPACECRAFT EQUATORIAL PLANE (SAME AS THE ECLIPTIC PLANE). THERE WERE FOUR 15-DEG INTERVALS, TWO 20-DEG INTERVALS, AND TWO 30-DEG INTERVALS. AS THE SPACECRAFT WAS SPINNING, FLUXES WERE MEASURED IN 15 AZIMUTHAL ANGULAR SECTORS. EIGHT OF THESE SECTORS WERE 5-5/8 DEG WIDE, WERE CONTIGUOUS, AND BRACKETED THE SOLAR DIRECTION. THE REMAINING SEVEN SECTORS WERE 45 DEG WIDE. THREE DIFFERENT MODES OF DATA COLLECTION WERE USED. AT THE HIGHEST BIT RATE (512 BPS), THE FULL SCAN MODE WAS ALTERNATED

WITH THE MAXIMUM FLUX MODE AT EACH E/Q STEP. IN THE FULL SCAN MODE, THE MAXIMUM FLUX OBSERVED IN EACH OF THE 15 AZIMUTHAL SECTORS AS THE SPACECRAFT ROTATED WAS RECORDED FOR A GIVEN SINGLE COLLECTOR AT A GIVEN E/Q STEP. DURING 24 SUCCESSIVE OPERATIONS OF THE FULL SCAN MODE (48 SPACECRAFT REVOLUTIONS), THE 16 ION E/Q STEPS AND EIGHT ELECTRON E/Q STEPS WERE EXERCISED FOR A GIVEN COLLECTOR. DURING EIGHT SUCCESSIVE SUCH PERIODS, EACH OF THE EIGHT COLLECTORS WAS EXERCISED. THE FULL CYCLE OF FULL SCAN MODE DATA REQUIRED 400 SPACECRAFT REVOLUTIONS (ABOUT 400 S). SUCH CYCLES WERE REPEATED WITHOUT INTERRUPTION AT THE HIGH BIT RATE. IN THE MAXIMUM FLUX MODE, FOR THE E/Q STEP USED IN THE PRECEDING REVOLUTION OF FULL SCAN MODE OPERATION, ALL COLLECTORS WERE OBSERVED FOR ONE REVOLUTION, AND THE MAXIMUM FLUX OBSERVED WAS REPORTED ALONG WITH THE NUMBER OF THE COLLECTOR THAT OBSERVED IT AND THE ANGULAR DIRECTION (2-13/16-DEG RESOLUTION) OF THE OBSERVATION. AT THE NEXT HIGHEST BIT RATE (256 BPS), THE SHORT SCAN MODE WAS ALTERNATED EVERY SPACECRAFT REVOLUTION WITH THE MAXIMUM FLUX MODE. THE SHORT SCAN MODE WAS THE SAME AS THE FULL SCAN MODE EXCEPT THAT ONLY THE PEAK FLUX IN EACH OF THE EIGHT 5-5/8-DEG-WIDE AZIMUTHAL SECTORS WAS RECORDED. THUS, THIS CYCLE ALSO TOOK 400 SPACECRAFT REVOLUTIONS. AT THE LOW BIT RATES (64, 16, AND 8 BPS), THE MAXIMUM FLUX MODE ALONE WAS USED. THUS, NO AZIMUTHAL DISTRIBUTIONS WERE MEASURED. AT THE LOW BIT RATES, IT TOOK 32 S FOR A COMPLETE SET OF ION MEASUREMENTS AND 16 S FOR A COMPLETE SET OF ELECTRON MEASUREMENTS. AT 64 BPS, THE ION AND ELECTRON MEASUREMENTS WERE TAKEN AND TELEMETERED EVERY 84 S. AT 16 BPS, THEY WERE TAKEN AND TELEMETERED EVERY 336 S. AT 8 BPS, THEY WERE TAKEN AND TELEMETERED EVERY 672 S.

***** PIONEER 9*****

SPACECRAFT COMMON NAME- PIONEER 9
ALTERNATE NAMES- PIONEER-D, PL-684K
03533

NSSDC ID- 68-100A

LAUNCH DATE- 11/08/68

WEIGHT- 147. KG

LAUNCH SITE- CAPE CANAVERAL, UNITED STATES

LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSS

ORBIT PARAMETERS

ORBIT TYPE- HELIOCENTRIC
ORBIT PERIOD- 297.6 DAYS
PERIAPSIS- 0.754 AU RAD

EPOCH DATE- 02/27/76
INCLINATION- 0.086 DEG
APOAPSIS- 0.990 AU RAD

PERSONNEL

MG - F.D. KOCHENDORFER
SC - A.G. OPP
PM - C.F. HALL
PS - J.H. WOLFE

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-ARC
NASA-ARC

BRIEF DESCRIPTION

PIONEER 9 WAS THE FOURTH IN A SERIES OF SOLAR-ORBITING, SPIN-STABILIZED, AND SOLAR-CELL AND BATTERY-POWERED SATELLITES DESIGNED TO OBTAIN MEASUREMENTS OF INTERPLANETARY PHENOMENA FROM WIDELY SEPARATED POINTS IN SPACE ON A CONTINUING BASIS. THE SPACECRAFT CARRIED EXPERIMENTS TO STUDY THE POSITIVE IONS AND ELECTRONS IN THE SOLAR WIND, THE INTERPLANETARY ELECTRON DENSITY (RADIO PROPAGATION EXPERIMENT), SOLAR AND GALACTIC COSMIC RAYS, THE INTERPLANETARY MAGNETIC FIELD, COSMIC DUST, AND ELECTRIC FIELDS. ALSO, A NEW CODING PROCESS WAS IMPLEMENTED FOR PIONEER 9. ITS MAIN ANTENNA WAS A HIGH-GAIN DIRECTIONAL ANTENNA. THE SPACECRAFT WAS SPIN-STABILIZED AT ABOUT 60 RPM, AND THE SPIN AXIS WAS PERPENDICULAR TO THE ECLIPTIC PLANE AND POINTED TOWARD THE SOUTH ECLIPTIC POLE. BY GROUND COMMAND, ONE OF FIVE BIT RATES, ONE OF FOUR DATA FORMATS, AND ONE OF FOUR OPERATING MODES COULD BE SELECTED. THE FIVE BIT RATES WERE 512, 256, 64, 16, AND 8 BPS. THREE OF THE FOUR DATA FORMATS CONTAINED PRIMARILY SCIENTIFIC DATA AND CONSISTED OF 32 SEVEN-BIT WORDS PER FRAME. ONE SCIENTIFIC DATA FORMAT WAS USED AT THE TWO HIGHEST BIT RATES, ANOTHER WAS USED AT THE THREE LOWEST BIT RATES, AND THE THIRD CONTAINED DATA FROM ONLY THE RADIO PROPAGATION EXPERIMENT. THE FOURTH DATA FORMAT CONTAINED MAINLY ENGINEERING DATA. THE FOUR OPERATING MODES WERE REAL TIME, TELEMETRY STORE, DUTY CYCLE STORE, AND MEMORY READOUT. IN THE REAL-TIME MODE, DATA WERE SAMPLED AND TRANSMITTED DIRECTLY (WITHOUT STORAGE) AS SPECIFIED BY THE DATA FORMAT AND BIT RATE SELECTED. IN THE TELEMETRY STORE MODE, DATA WERE STORED AND TRANSMITTED SIMULTANEOUSLY IN THE FORMAT AND AT THE BIT RATE SELECTED. IN THE DUTY CYCLE STORE MODE, A SINGLE FRAME OF SCIENTIFIC DATA WAS COLLECTED AND STORED AT A RATE OF 512 BPS. THE TIME PERIOD BETWEEN WHICH SUCCESSIVE FRAMES WERE COLLECTED AND STORED COULD BE VARIED BY GROUND COMMAND BETWEEN 2 AND 17 MIN TO PROVIDE PARTIAL DATA COVERAGE FOR PERIODS OF UP TO 19 H, AS LIMITED BY THE BIT STORAGE CAPACITY. IN THE MEMORY READOUT MODE, DATA WERE READ OUT AT WHATEVER BIT RATE WAS APPROPRIATE TO THE SATELLITE DISTANCE FROM THE EARTH.

----- PIONEER 9, ANDERSON-----

INVESTIGATION NAME- CELESTIAL MECHANICS

NSSDC ID- 68-100A-08

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
CELESTIAL MECHANICS

PERSONNEL
PI - J.D. ANDERSON

NASA-JPL

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION WERE TO: (1) OBTAIN PRIMARY DETERMINATIONS OF THE MASSES OF THE EARTH AND MOON AND THE DISTANCE BETWEEN THE EARTH AND SUN (AU), (2) USE THE TRACKING DATA FROM THE WHOLE SERIES OF PIONEER PROBES IN A PROGRAM DESIGNED TO IMPROVE THE EPHEMERIS OF THE EARTH, AND (3) INVESTIGATE THE POSSIBILITY OF A TEST OF GENERAL RELATIVISTIC MECHANICS USING THE PIONEER ORBITS AND DATA. THE INSTRUMENTATION WAS A TWO-WAY S-BAND DOPLER TRACKING MECHANISM USING HIGH-GAIN ANTENNAS WITH DISK-LIKE PATTERNS IN A PLANE PERPENDICULAR TO THE SPIN-AXIS OF THE SPACECRAFT. WHEN THE SPIN-AXIS WAS PERPENDICULAR TO THE ECLIPTIC, RADIO SIGNALS FROM THE ANTENNA CONTINUOUSLY ILLUMINATE THE EARTH. DATA WAS TRANSMITTED CONTINUOUSLY AND WAS RECEIVED AT GROUND-BASED DEEP SPACE NETWORK STATIONS WITH 26.5-M DIAMETER ANTENNAS AND WITH THE 64-M ANTENNA IN CALIFORNIA.

----- PIONEER 9, BERG-----

INVESTIGATION NAME- COSMIC DUST DETECTOR

NSSDC ID- 68-100A-04

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST

PERSONNEL
PI - O.E. BERG (RETIRED)

NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO (1) MEASURE THE COSMIC DUST FLUX DENSITY IN THE SOLAR SYSTEM, (2) DETERMINE THE DISTRIBUTION OF COSMIC DUST CONCENTRATIONS IN THE EARTH'S ORBIT, (3) DETERMINE THE GRADIENT, FLUX DENSITY, AND SPEED OF PARTICLES IN METEOR STREAMS, AND (4) PERFORM AN IN-FLIGHT CONTROL EXPERIMENT ON THE RELIABILITY OF THE MICROPHONE AS A COSMIC DUST SENSOR. THE EXPERIMENT INSTRUMENTATION WAS IDENTICAL TO THAT CARRIED ON PIONEER 8, CONSISTING ESSENTIALLY OF TWO THIN FILM-GRID DETECTORS (SEPARATED BY A DISTANCE OF 5 CM) THAT PRODUCED AN ELECTRICAL SIGNAL WHEN THE FILM WAS PENETRATED BY A MICROMETEOROID. EACH FILM HAD A SENSITIVE AREA OF 100 SQ CM AND WAS COMPOSED OF 16 SEGMENTS THAT PROVIDED BOTH THE DIRECTION AND THE TIME-OF-FLIGHT NEEDED FOR THE METEOROID TO TRAVERSE THE 5-CM DISTANCE BETWEEN THE FRONT FILM AND REAR FILM SENSOR. THE COMBINED RESULTS OF THE PIONEER 8 AND 9 COSMIC DUST EXPERIMENTS LENT STRONG SUPPORT TO THE HYPOTHESIS THAT THE BULK OF METEOROID DUST IS OF COMETARY ORIGIN.

----- PIONEER 9, ESHLEMAN-----

INVESTIGATION NAME- TWO-FREQUENCY BEACON RECEIVER

NSSDC ID- 68-100A-03

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL
PI - V.R. ESHLEMAN
OI - T.A. CROFT
OI - H.T. HOWARD
OI - R.L. LEADABRAND
OI - R.A. LONG
OI - A.M. PETERSON

STANFORD U
SRI INTERNATIONAL
STANFORD U
SRI INTERNATIONAL
SRI INTERNATIONAL
STANFORD U

BRIEF DESCRIPTION

BOTH 423.3-MHZ AND ITS 2/17 SUBHARMONIC 49.8-MHZ SIGNALS WERE TRANSMITTED FROM A 4.6-M STEERABLE PARABOLIC ANTENNA AT STANFORD UNIVERSITY TO THE TWO-FREQUENCY RADIO RECEIVER ON THE SPACECRAFT. THE HIGH-FREQUENCY SIGNAL SERVED AS A REFERENCE SIGNAL SINCE ITS PROPAGATION TIME WAS NOT APPRECIABLY DELAYED. THE LOW-FREQUENCY SIGNAL WAS DELAYED IN PROPORTION TO THE TOTAL ELECTRON CONTENT IN THE PROPAGATION PATH. ON THE SPACECRAFT, A PHASE-LOCKED RECEIVER COUNTED THE BEAT FREQUENCY ZERO CROSSINGS OF THE RECEIVED SIGNALS TO OBTAIN MEASUREMENTS OF PHASE-PATH DIFFERENCES. DIFFERENTIAL DELAY OF THE GROUP VELOCITY WAS ALSO OBSERVED, AND THESE VALUES WERE TELEMETERED TO THE GROUND STATION AND USED TO CALCULATE THE TOTAL ELECTRON CONTENT. THE IONOSPHERIC CONTRIBUTION (UP TO A SELECTED ALTITUDE OBTAINED FROM OTHER EXPERIMENTAL TECHNIQUES) COULD BE SUBTRACTED TO PRODUCE DATA DESCRIBING THE INTERPLANETARY ELECTRON CONTENT OF THE SOLAR WIND AND ITS VARIATIONS. MORE DETAILED DESCRIPTIONS OF THE EXPERIMENT CAN BE FOUND IN J. GEOPHYS. RES., 71, 3325-3327, AND IN RADIO SCIENCE, 6, 55-63.

----- PIONEER 9, MCCracken-----

INVESTIGATION NAME- COSMIC-RAY ANISOTROPY

NSSDC ID- 68-100A-05

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - K.G. MCCracken
OI - U.R. RAO
OI - W.C. BARTLEY

CSIRO
ISSP, VSSC
NATL ACADEMY OF SCI

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A CSI SCINTILLATOR AND THREE SOLID-STATE TELESCOPES. THE CSI SCINTILLATOR WAS COLLIMATED BY AN ANTICOINCIDENCE PLASTIC SCINTILLATOR AND HAD A CONICAL APERTURE WITH A 38.2-DEG HALF-ANGLE. THE SCINTILLATOR LOOK DIRECTION WAS CENTERED IN THE ECLIPTIC PLANE. THREE SOLID-STATE DETECTORS WERE ORIENTED IN A FAN ARRANGEMENT WITH RESPECT TO A FOURTH SOLID-STATE DETECTOR SUCH THAT EACH OF THE FIRST THREE DETECTORS FORMED A TELESCOPE WITH THE FOURTH DETECTOR. EACH OF THE THREE TELESCOPES THUS FORMED HAD AN ACCEPTANCE CONE OF 23-DEG HALF-ANGLE. THE MEAN VIEWING DIRECTIONS OF THE TELESCOPES WERE IN THE ECLIPTIC PLANE AND 48 DEG ABOVE AND BELOW THAT PLANE, RESPECTIVELY. TWO CONCURRENT MODES OF COUNTING WERE EMPLOYED. IN THE FIRST MODE, COUNTS WERE ACCUMULATED IN EIGHT SEPARATE 45-DEG INTERVALS DURING THE SPACECRAFT SPIN, WHILE, IN THE SECOND, SPIN-INTEGRATED COUNTS WERE ACQUIRED. IN THE FIRST MODE, THE SCINTILLATOR SEPARATELY MEASURED PARTICLES WITH ENERGIES IN THE RANGES 7.4 TO 21.5 MEV/NUCLEON AND 19.7 TO 63.0 MEV/NUCLEON (NO SPECIES DISCRIMINATION) WHILE EACH SOLID-STATE TELESCOPE SEPARATELY MEASURED PROTONS IN THE ENERGY RANGES 3.3 TO 3.6 MEV AND 3.6 TO 6.7 MEV. IN THE SECOND MODE, THE SCINTILLATOR SEPARATELY MEASURED PARTICLES IN SIX CONTIGUOUS ENERGY INTERVALS BETWEEN 4.5 AND 40 MEV/NUCLEON (INTERVAL LOWER LIMITS AT 4.5, 7.0, 9.6, 13, 21, AND 28 MEV/NUCLEON), WHILE EACH OF THE SOLID-STATE TELESCOPES SEPARATELY MEASURED PROTONS IN THE ENERGY RANGES 1 TO 8, 1 TO 5, 1 TO 3, AND 4 TO 6 MEV AND ALPHA PARTICLES IN THE ENERGY RANGE 4 TO 8 MEV. DURING EACH 224-BIT MAIN TELEMETRY FRAME, TWO FIRST-MODE 9-BIT ACCUMULATORS AND ONE SECOND-MODE 9-BIT ACCUMULATOR WERE READ OUT. IN-FLIGHT CALIBRATION OF THE SCINTILLATOR AND OF SOME OF THE ELECTRONICS WAS PERFORMED DAILY. SEE BUKATA ET AL., 'IEEE TRANS. NUC. SCI.,' NS-17, 18-24, 1970, FOR A MORE DETAILED EXPERIMENT DESCRIPTION.

----- PIONEER 9, SCARF-----

INVESTIGATION NAME- PLASMA WAVE DETECTOR

NSSDC ID- 68-100A-07

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - F.L. SCARF
OI - I.M. GREEN
OI - G.M. CROOK
OI - R.W. FREDERICKS

TRW SYSTEMS GROUP
TRW SYSTEMS GROUP
GAINES M. CROOK ASSOC
TRW SYSTEMS GROUP

BRIEF DESCRIPTION

ELECTROSTATIC AND ELECTROMAGNETIC PLASMA WAVES WERE MEASURED IN THE SOLAR WIND NEAR 1 AU USING AN UNBALANCED ELECTRIC DIPOLE ANTENNA. THE 423-MHZ STANFORD UNIVERSITY ANTENNA, WHICH SERVED AS THE SENSOR, WAS CAPACITIVELY COUPLED TO THREE TELEMETRY CHANNELS. CHANNEL 1 WAS A 15-PERCENT BANDPASS FILTER CENTERED AT 400 HZ. CHANNEL 2 WAS A 15-PERCENT BANDPASS FILTER CENTERED AT 30 KHZ. THESE CHANNELS WERE EACH SAMPLED 64 TIMES PER TELEMETRY SEQUENCE. CHANNEL 3 WAS A BROADBAND 100-HZ TO 100-KHZ CHANNEL. THE BROADBAND CHANNEL WAS FED INTO A COUNT RATE METER THAT MEASURED THE NUMBER OF POSITIVE-GOING PULSES PER UNIT TIME HAVING AMPLITUDES LARGE ENOUGH TO CROSS THE PRESENT TRIGGER LEVEL. THE TRIGGER LEVEL WAS VARIED THROUGH EIGHT STEPS, EIGHT TIMES PER TELEMETRY SEQUENCE. THE TRIGGER LEVELS, TOGETHER WITH THE COUNT RATE AT EACH LEVEL, GAVE A MEASURE OF THE BROADBAND POWER SPECTRUM. DUE TO AMBIENT CONDITIONS, THESE DATA USUALLY REPRESENT THE POWER AT ABOUT 100 HZ. THE TELEMETRY SEQUENCE WAS REPEATED OVER TIME INTERVALS FROM 7 MIN 28 S TO 472 MIN 52 S.

----- PIONEER 9, SONETT-----

INVESTIGATION NAME- TRIAXIAL MAGNETOMETER

NSSDC ID- 68-100A-01

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - C.P. SONETT
OI - D.S. COLBURN

U OF ARIZONA
NASA-ARC

BRIEF DESCRIPTION

A BOOM-MOUNTED, TRIAXIAL FLUXGATE MAGNETOMETER WAS USED TO STUDY THE INTERPLANETARY MAGNETIC FIELD AND ITS FLUCTUATIONS. THE SENSORS WERE ORTHOGONALLY MOUNTED WITH ONE AXIS PARALLEL TO THE SPACECRAFT SPIN AXIS. UPON COMMAND, A MOTOR INTERCHANGED A SENSOR IN THE SPIN PLANE WITH THE SENSOR ALONG THE SPIN AXIS, ENABLING IN-FLIGHT DETERMINATION OF ZERO LEVELS. EVERY 24 HR, THE INSTRUMENT WAS COMMANDED INTO A SELF-CALIBRATE SEQUENCE, AND THIS WAS OFTEN REPEATED AFTER THE SENSORS WERE FLIPPED. THE INSTRUMENT, WHICH HAD A DYNAMIC RANGE OF PLUS OR MINUS 200 NT WITH A RESOLUTION OF PLUS OR MINUS 0.2 NT, WAS CAPABLE OF INFLIGHT DEMODULATION OF THE SIGNALS RECEIVED FROM THE TWO SENSORS IN THE SPIN PLANE. EACH MAGNETIC FIELD COMPONENT WAS DIGITIZED INTO A 10-BIT TELEMETRY WORD. NINE MAGNETIC FIELD COMPONENTS, COMPRISING THREE MAGNETIC FIELD VECTORS, WERE TRANSMITTED IN EACH SPACECRAFT TELEMETRY FRAME.

----- PIONEER 9, WEBBER -----

INVESTIGATION NAME- COSMIC-RAY TELESCOPE

NSSDC ID- 68-100A-06

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - W.R. WEBBER

U OF NEW HAMPSHIRE

BRIEF DESCRIPTION

THIS EXPERIMENT UTILIZED A TELESCOPE COMPRISED OF FIVE SOLID-STATE SENSORS, A CERENKOV DETECTOR, AND AN ANTICOINCIDENCE SHIELD. THE TELESCOPE AXIS WAS PERPENDICULAR TO THE SPACECRAFT SPIN AXIS. AS DETERMINED BY TWO COINCIDENCE MODES AND ELECTRONIC DISCRIMINATION OF SENSOR OUTPUT PULSES, PARTICLES MEASURED WERE ELECTRONS IN THREE CONTIGUOUS ENERGY INTERVALS BETWEEN 0.31 AND 5.1 MEV, PROTONS IN FIVE CONTIGUOUS ENERGY INTERVALS BETWEEN 2.2 AND 42 MEV, AND ALPHA PARTICLES IN THOSE CONTIGUOUS ENERGY INTERVALS BETWEEN 5.8 AND 42 MEV/NUCLEON. A THIRD COINCIDENCE MODE MEASURED THE SUM OF COUNTS DUE TO ELECTRONS ABOVE 0.6 MEV AND NUCLEI ABOVE 14 MEV/NUCLEON. A FOURTH COINCIDENCE MODE MEASURED THE SUM OF NUCLEI ABOVE 42 MEV/NUCLEON AND ELECTRONS ABOVE 5.1 MEV. SPACECRAFT SPIN-INTEGRATED DIRECTIONAL FLUXES WERE MEASURED IN THE VARIOUS MODES. ACCUMULATION TIMES AND READOUT INTERVALS WERE DEPENDENT ON THE TELEMETRY BIT RATE AND WERE TYPICALLY IN TENS OF SECONDS. IN ALL CASES, THEY WERE LONGER THAN THE SPACECRAFT SPIN PERIOD.

----- PIONEER 9, WOLFE -----

INVESTIGATION NAME- ELECTROSTATIC ANALYZER

NSSDC ID- 68-100A-02

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - J.H. WOLFE

NASA-ARC

OI - D.D. MCKIBBIN

NASA-ARC

BRIEF DESCRIPTION

A TRUNCATED HEMISPHERICAL ELECTROSTATIC ANALYZER (120-DEG TOTAL PARALLEL PLATE CURVATURE) WITH THREE CONTIGUOUS CURRENT COLLECTORS WAS USED TO STUDY THE DIRECTIONAL INTENSITY OF THE ELECTRONS AND POSITIVE IONS IN THE SOLAR WIND. IONS WERE DETECTED IN 30 LOGARITHMICALLY EQUISPACED ENERGY PER UNIT CHARGE (E/Q) STEPS FROM 150 TO 15,000 V. THERE WAS AN ELECTRON MODE OF OPERATION IN WHICH ELECTRONS WERE MEASURED IN 14 LOGARITHMICALLY EQUISPACED E/Q STEPS RANGING FROM 12 TO 1000 V. THERE WAS ALSO A ZERO E/Q, OR BACKGROUND, STEP. THE THREE COLLECTORS MEASURED PARTICLES INCIDENT FROM THREE DIFFERENT CONTIGUOUS ANGULAR INTERVALS RELATIVE TO THE SPACECRAFT EQUATORIAL PLANE (SAME AS THE ECLIPTIC PLANE). TWO COLLECTORS MEASURED FLUX FROM 10 TO 85 DEG ON EITHER SIDE OF THE SPACECRAFT EQUATORIAL PLANE, AND THE THIRD MEASURED FLUX IN A 20-DEG INTERVAL CENTERED ON THE SPACECRAFT EQUATORIAL PLANE. AS THE SPACECRAFT WAS SPINNING, FLUXES WERE MEASURED IN 23 POSSIBLE 2-13/16-DEG WIDE AZIMUTHAL ANGULAR SECTORS. SEVENTEEN OF THESE SECTORS WERE CONTIGUOUS AND BRACKETED THE SOLAR DIRECTION. THE REMAINING SIX SECTORS WERE WIDELY SPACED. THE INSTRUMENT HAD THREE MODES OF DATA COLLECTION -- POLAR SCAN, AZIMUTHAL SCAN, AND MAXIMUM FLUX. AT THE TWO HIGHEST BIT RATES (512 AND 256 BPS), THE POLAR SCAN MODE WAS ALTERNATED WITH THE AZIMUTHAL SCAN MODE AT EACH E/Q STEP. IN THE POLAR SCAN MODE, ALL THREE COLLECTORS WERE OBSERVED, AND THE PEAK FLUX OBTAINED AND THE AZIMUTHAL DIRECTION (TO 2-13/16 DEG) OF THE OBSERVATION WERE REPORTED FOR EACH COLLECTOR. IN THE AZIMUTHAL SCAN MODE, THE PEAK FLUX OBSERVED IN THE 23 AZIMUTHAL SECTORS WAS RECORDED FOR THE CENTRAL COLLECTOR AT EACH E/Q STEP. AT THE LOW BIT RATES (64, 16, AND 8 BPS), THE MAXIMUM FLUX MODE WAS USED AT EACH E/Q STEP FOLLOWED BY EITHER (1) FOR IONS, A POLAR SCAN AND AN AZIMUTHAL SCAN AT THAT E/Q STEP WHERE THE PEAK FLUX MEASUREMENT DURING THE MAXIMUM FLUX MODE WAS OBTAINED, OR (2) FOR ELECTRONS, A POLAR SCAN AND AN AZIMUTHAL SCAN AT E/Q = 100

V. IN THE MAXIMUM FLUX MODE, ONLY THE CENTRAL COLLECTOR WAS OBSERVED, AND THE PEAK FLUX OBTAINED AND THE AZIMUTHAL DIRECTION (TO 2-13/16 DEG) OF THE OBSERVATION WERE REPORTED. A COMPLETE SET OF MEASUREMENTS CONSISTED OF SEVEN SETS OF ION MEASUREMENTS (AT EACH E/Q STEP) AND ONE SET OF ELECTRON MEASUREMENTS (AT EACH E/Q STEP). AT THE HIGH BIT RATES (512 AND 256 BPS) ONE SET OF ION MEASUREMENTS TOOK 62 S AND ONE SET OF ELECTRONS MEASUREMENTS 38 S. AT THE LOW BIT RATES (64, 16, AND 8 BPS), ONE SET OF ION MEASUREMENTS TOOK 37 S AND ONE SET OF ELECTRONS MEASUREMENTS 28 S. AT 64 BPS, A COMPLETE SET OF MEASUREMENTS (SEVEN IONS PLUS ONE ELECTRON) WAS TAKEN AND TELEMETERED EVERY 402.5 S. AT 16 BPS, IT TOOK 1610 S, AND, AT 8 BPS, IT TOOK 3220 S.

***** PIONEER 10*****

SPACECRAFT COMMON NAME- PIONEER 10
ALTERNATE NAMES- PIONEER-F, PL-723D
05860

NSSDC ID- 72-012A

LAUNCH DATE- 03/03/72

WEIGHT- 231. KG

LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- JUPITER FLYBY

PERSONNEL

MG - F.D. KOCHENDORFER
SC - A.G. OPP
PM - C.F. HALL
PS - J.H. WOLFE

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-ARC
NASA-ARC

BRIEF DESCRIPTION

THIS MISSION WAS THE FIRST TO BE SENT TO THE OUTER SOLAR SYSTEM, AND AFTER ENCOUNTERING THE PLANET JUPITER IT ASSUMED A TRAJECTORY THAT WOULD ESCAPE FROM THE SOLAR SYSTEM. THE SPACECRAFT BODY WAS MOUNTED BEHIND A 2.74-M-DIAMETER PARABOLIC DISH ANTENNA THAT WAS 46 CM DEEP. THE SPACECRAFT STRUCTURE WAS A 36-CM-DEEP FLAT EQUIPMENT COMPARTMENT, THE TOP AND BOTTOM BEING REGULAR HEXAGONS. ITS SIDES WERE 71 CM LONG. ONE SIDE JOINED A SMALLER COMPARTMENT THAT CARRIED THE SCIENTIFIC EXPERIMENTS. THE HIGH-GAIN ANTENNA FEED WAS SITUATED ON THREE STRUTS, WHICH PROJECTED FORWARD ABOUT 1.2 M. THIS FEED WAS TOPPED WITH A MEDIUM-GAIN ANTENNA. A LOW-GAIN OMNI-DIRECTIONAL ANTENNA EXTENDED ABOUT 0.76 M BEHIND THE EQUIPMENT COMPARTMENT AND WAS MOUNTED BELOW THE HIGH GAIN ANTENNA. POWER FOR THE SPACECRAFT WAS OBTAINED BY FOUR SNAP 19 RADIOISOTOPE THERMONUCLEAR GENERATORS (RTG), WHICH WERE HELD ABOUT 3 M FROM THE CENTER OF THE SPACECRAFT BY TWO THREE-ROD TRUSSES 120 DEG APART. A THIRD BOOM EXTENDED 6.6 M FROM THE EXPERIMENT COMPARTMENT TO HOLD THE MAGNETOMETER AWAY FROM THE SPACECRAFT. THE FOUR RTG'S GENERATED ABOUT 155 WATTS AT LAUNCH AND DECAYED TO APPROXIMATELY 140 WATTS BY THE TIME THE SPACECRAFT REACHED JUPITER, 21 MONTHS AFTER LAUNCH IN DECEMBER 1973. THERE WERE THREE REFERENCE SENSORS -- STAR SENSOR FOR CANOPUS, AND TWO SUN SENSORS. ATTITUDE POSITION COULD BE CALCULATED FROM THE REFERENCE DIRECTIONS TO THE EARTH AND THE SUN WITH THE KNOWN DIRECTION TO CANOPUS AS A BACKUP. THREE PAIRS OF ROCKET THRUSTERS PROVIDED SPIN RATE CONTROL (MAINTAINED AT 4.8 RPM) AND CHANGED THE VELOCITY OF THE SPACECRAFT. THESE THRUSTERS COULD BE PULSED OR FIRED STEADILY BY COMMAND. COMMUNICATIONS WERE MAINTAINED VIA THE OMNIDIRECTIONAL AND MEDIUM-GAIN ANTENNAS, WHICH OPERATED TOGETHER, CONNECTED TO ONE RECEIVER, WHILE THE HIGH-GAIN ANTENNA WAS CONNECTED TO ANOTHER RECEIVER. THESE RECEIVERS COULD BE INTERCHANGED BY COMMAND TO PROVIDE SOME REDUNDANCY. TWO RADIO TRANSMITTERS, COUPLED TO TWO TRAVELING WAVE TUBE AMPLIFIERS, PRODUCED 8 WATTS AT 2292 MHZ EACH. UPLINK WAS ACCOMPLISHED AT 2110 MHZ WHILE DATA TRANSMISSION DOWNLINK WAS AT 2292 MHZ. THE DATA WERE RECEIVED BY NASA'S DEEP SPACE NETWORK. THE SPACECRAFT WAS TEMPERATURE-CONTROLLED BETWEEN MINUS 23 DEG C AND PLUS 38 DEG C. FIFTEEN EXPERIMENTS WERE CARRIED TO STUDY THE INTERPLANETARY AND PLANETARY MAGNETIC FIELDS; SOLAR WIND PARAMETERS; COSMIC RAYS; TRANSITION REGION OF THE HELIOSPHERE; NEUTRAL HYDROGEN ABUNDANCE; DISTRIBUTION, SIZE, MASS, FLUX, AND VELOCITY OF DUST PARTICLES; JOVIAN AURORAE; JOVIAN RADIO WAVES; ATMOSPHERE OF JUPITER AND SOME OF ITS SATELLITES, PARTICULARLY IO; AND TO PHOTOGRAPH JUPITER AND ITS SATELLITES. EQUIPMENT CARRIED FOR THESE EXPERIMENTS WERE -- MAGNETOMETER, PLASMA ANALYZER, CHARGED PARTICLE DETECTOR, IONIZING DETECTOR, NON-IMAGING TELESCOPES WITH OVERLAPPING FIELDS OF VIEW TO DETECT SUNLIGHT REFLECTED FROM PASSING METEOROIDS, SEALED PRESSURIZED CELLS OF ARGON AND NITROGEN GAS FOR MEASURING THE PENETRATION OF METEOROIDS, UV PHOTOMETER, IR RADIOMETER, AND AN IMAGING PHOTOPOLARIMETER, WHICH PRODUCED PHOTOGRAPHS AND MEASURED POLARIZATION. FURTHER SCIENTIFIC INFORMATION WAS OBTAINED FROM THE TRACKING AND OCCULTATION DATA. THE SPACECRAFT ACHIEVED ITS CLOSEST APPROACH ON DECEMBER 3, 1973, WHEN IT REACHED APPROXIMATELY 3 JOVIAN RADII. THE SPACECRAFT CONTAINS PLAQUES THAT HAVE DRAWINGS DEPICTING A MAN, A WOMAN, AND THE LOCATION OF THE SUN AND THE EARTH IN OUR GALAXY.

----- PIONEER 10, ANDERSON-----

INVESTIGATION NAME- CELESTIAL MECHANICS

NSSDC ID- 72-012A-09

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
PLANETEOLOGY
CELESTIAL MECHANICS

PERSONNEL

PI - J.D. ANDERSON
OI - G.V. NULL

NASA-JPL
NASA-JPL

BRIEF DESCRIPTION

TWO-WAY DOPPLER TRACKING OF THE SPACECRAFT WAS USED TO MAKE MORE PRECISE DETERMINATIONS OF PLANETARY MASSES, THE HELIOCENTRIC ORBIT OF JUPITER, AND THE GRAVITATIONAL FIELDS OF THE SUN, JUPITER, AND THE GALILEAN SATELLITES.

----- PIONEER 10, FILLIUS-----

INVESTIGATION NAME- JOVIAN TRAPPED RADIATION

NSSDC ID- 72-012A-05

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - R.W. FILLIUS
OI - C.E. MCILWAIN

U OF CALIF, SAN DIEGO
U OF CALIF, SAN DIEGO

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF AN ARRAY OF FIVE PARTICLE DETECTORS WITH ELECTRON THRESHOLDS IN THE RANGE .01 TO 35 MEV AND PROTON THRESHOLDS IN THE RANGE 0.15 TO 80 MEV. A CERENKOV COUNTER (C) HAD FOUR OUTPUT CHANNELS (C1, C2, C3, AND CDC) SENSITIVE TO ELECTRONS HAVING ENERGIES ABOVE 6, 9, 13, AND 1 MEV, RESPECTIVELY. AN ELECTRON SCATTER COUNTER (E) HAD THREE OUTPUT CHANNELS (E1, E2, AND E3) SENSITIVE TO ELECTRONS ABOVE .16, .26, AND .46 MEV. A MINIMUM IONIZATION COUNTER (M) HAD THREE OUTPUT CHANNELS, M1 SENSITIVE TO ELECTRONS HAVING ENERGIES GREATER THAN 35 MEV, M2 THAT MEASURED BACKGROUND, AND M3 THAT WAS SENSITIVE TO PROTONS HAVING ENERGIES GREATER THAN 80 MEV. THE LAST TWO SENSORS WERE SCINTILLATOR DETECTORS (SP AND SE), BOTH OF WHICH HAD ENERGY THRESHOLDS OF 10 KEV FOR ELECTRONS AND 150 KEV FOR PROTONS. THE SENSITIVITY OF THE SE DETECTOR TO PROTONS WAS ABOUT A FACTOR OF 10 LOWER THAN ITS SENSITIVITY TO ELECTRONS. THUS, THE SEDC CHANNEL EFFECTIVELY MEASURED THE ELECTRON FLUX, WHICH COULD THEN BE SUBTRACTED FROM THE SPDC CHANNEL RESPONSE TO OBTAIN THE PROTON FLUX. SEVERAL OTHER CHANNELS LISTED ABOVE REQUIRED CORRECTIONS TO OBTAIN THE FLUXES OF THE SPECIES INDICATED. THREE OF THE CHANNELS (CDC, SPDC, AND SEDC) WERE READ OUT THROUGH A COMMON ELECTROMETER. DUE TO A MALFUNCTION THAT OCCURRED BETWEEN LAUNCH AND JOVIAN ENCOUNTER, THESE THREE CHANNELS PRODUCED NO USABLE ENCOUNTER DATA. THE DETECTOR CHANNELS COULD BE PROGRAMMED FOR READ-OUT IN ANY ONE OF FOUR PATTERNS AT EACH OF THE EIGHT SPACECRAFT BIT RATE MODES. DURING ENCOUNTER WHEN THE SPACECRAFT WAS OPERATING IN THE HIGHEST BIT RATE MODE, THE MINIMUM TIME TO SAMPLE ONE CHANNEL WAS 1.5 S AND THE TIME TO OBTAIN A COMPLETE SCAN THROUGH ALL CHANNELS WAS 108 S. SINCE THE DIRECTIONAL DETECTORS POINTED PERPENDICULAR TO THE SPIN AXIS AND THE SPIN RATE WAS 5 RPM, PITCH ANGLE MEASUREMENTS WERE OBTAINED. WHILE THE EXPERIMENT WAS PRIMARILY DESIGNATED FOR ENCOUNTER STUDIES, SOME DATA WERE OBTAINED AT LOW RATES IN INTERPLANETARY SPACE. A DESCRIPTION OF THE INSTRUMENTATION AND INITIAL RESULTS WAS PUBLISHED IN JGR, 79, 3589, 1974.

----- PIONEER 10, GEHRELS-----

INVESTIGATION NAME- IMAGING PHOTOPOLARIMETER (IPP)

NSSDC ID- 72-012A-07

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
PLANETARY ATMOSPHERES

PERSONNEL

PI - T. GEHRELS
OI - D.L. COFFEEN
OI - J. HAMEEN-ANTTILA
OI - C.E. KENKNIGHT
OI - R.F. HUMMER
OI - M.G. TOMASKO
OI - W. SWINDELL

U OF ARIZONA
NASA-GISS
U OF ARIZONA
U OF ARIZONA
SANTA BARBARA RES CTR
U OF ARIZONA
U OF ARIZONA

BRIEF DESCRIPTION

THE IMAGING PHOTOPOLARIMETER (IPP) EXPERIMENT WAS USED DURING JOVIAN ENCOUNTER TO MAKE SIMULTANEOUS TWO-COLOR (BLUE - 3900 TO 4900 A, RED - 5800 TO 7000 A) POLARIMETRIC AND RADIOMETRIC MEASUREMENTS, AND MODERATE-RESOLUTION (ABOUT 200 KM AT BEST) SPIN-SCAN IMAGES OF JUPITER AND THE JOVIAN SATELLITES. THE POLARIMETRIC AND RADIOMETRIC WORK WAS PERFORMED USING AN 8-X 8-MRAD FIELD-STOP APERTURE, WHILE THE SPIN-SCAN IMAGING USED A 0.5- BY 0.5-MRAD APERTURE STOP. RELATIVE RADIOMETRIC CALIBRATION WAS DERIVED USING AN INTERNAL TUNGSTEN LAMP.

LONG-TERM ABSOLUTE CALIBRATION OF THE INSTRUMENT WAS ACCOMPLISHED BY MEANS OF A SUNLIGHT DIFFUSER/ATTENUATOR ELEMENT LOCATED IN THE SPACECRAFT ANTENNA STRUCTURE; I.E., PRIMARY RADIOMETRIC CALIBRATION WAS OBTAINED THROUGHOUT THE MISSION BY PERIODICALLY COMMANDING THE TELESCOPE TO VIEW THIS DIFFUSE BACKLIGHTED (SUNLIGHT) SOURCE. THE EXPERIMENTAL TRAIN FOR THE IPP PACKAGE CONSISTED OF THE FOLLOWING ELEMENTS -- (1) A NEAR-DIFFRACTION-LIMITED 2.54-CM MAKSUOTOV CATADIOPTRIC TELESCOPE (F/3.4), (2) A FOCAL PLANE WHEEL CONTAINING FIELD-OF-VIEW APERTURES, DEPOLARIZERS, CALIBRATION SOURCE, ETC., (3) A WOLLASTON PRISM TO SPLIT LIGHT INTO TWO ORTHOGONALLY POLARIZED BEAMS, (4) A 45-DEG DICHROMATIC MIRROR THAT REFLECTED WAVELENGTHS LESS THAN 5500 A (BLUE BEAM) AND TRANSMITTED ALL LIGHT OF GREATER WAVELENGTH (RED BEAM), (5) FOR EACH SPECTRAL BEAM (TWO POLARIZATIONS), A FILTERING COATED RELAY LENS AND FOLDING MIRRORS, AND (6) FOR EACH SPECTRAL BEAM, TWO BENDIX CHANNELTRON DETECTORS (BLUE BIALKALI S-11 PHOTOCATHODES RED S-20 PHOTOCATHODES) TO REGISTER THE INTENSITY IN EACH POLARIZATION COMPONENT.

----- PIONEER 10, INGERSOLL-----

INVESTIGATION NAME- INFRARED RADIOMETERS

NSSDC ID- 72-012A-08

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
PLANETARY ATMOSPHERES
PLANETEOLOGY

PERSONNEL

PI - A.P. INGERSOLL
OI - G. NEUGEBAUER
OI - S.C. CHASE, JR.

CALIF INST OF TECH
CALIF INST OF TECH
SANTA BARBARA RES CTR

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO MEASURE THE IRRADIANCE OF JUPITER'S ATMOSPHERE AND SURFACE IN TWO RANGES OF THERMAL (IR) WAVELENGTHS -- 14 TO 25 MICROMETERS (MICRONS) AND 19 TO 56 MICROMETERS. THESE MEASUREMENTS PROVIDED DATA ON THE NET THERMAL ENERGY FLUX OF JUPITER AND ITS DEVIATION FROM A BLACKBODY SPECTRUM. IN ADDITION, DETAILED INFORMATION WAS PROVIDED ON THE ATMOSPHERIC THERMAL STRUCTURE AND CHEMICAL COMPOSITION OF THE PLANET. THE INSTRUMENTATION FOR THIS EXPERIMENT WAS SIMILAR TO THAT CARRIED ON THE MARINER MARS 1969 FLIGHTS BUT HAD HIGHER RESOLUTION. IT WAS A TWO-CHANNEL IR RADIOMETER EMPLOYING A PAIR OF 88-CHANNEL, THIN-FILM BIMETALLIC THERMOCOUPLES, ILLUMINATED THROUGH APPROPRIATE OPTICS BY A 7.62-CM REFLECTING CASSEGRAIN TELESCOPE WITH A 1-DEG BY 0.3-DEG FIELD OF VIEW. ANALYSIS OF THE DATA WAS TO HELP RESOLVE -- (1) WHETHER JUPITER IS RADIATING A SIGNIFICANT AMOUNT OF INTERNAL ENERGY, (2) THE EXISTENCE OF A FROZEN METHANE POLAR CAP, (3) THE BRIGHTNESS TEMPERATURE ON THE DARK HEMISPHERE, AND (4) THE EXISTENCE OF THERMAL DISCONTINUITIES IN THE ATMOSPHERE.

----- PIONEER 10, JUDGE-----

INVESTIGATION NAME- ULTRAVIOLET PHOTOMETRY

NSSDC ID- 72-012A-06

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
PLANETARY ATMOSPHERES

PERSONNEL

PI - D.L. JUDGE
OI - R.W. CARLSON

U OF SOUTHERN CALIF
U OF SOUTHERN CALIF

BRIEF DESCRIPTION

THIS EXPERIMENT, CONSISTING OF A BROADBAND PHOTOMETER SENSITIVE BETWEEN 200 AND 800 A, OBSERVED EVIDENCE OF HELIUM, WHICH IN TURN INDICATED INTERACTIONS BETWEEN CHARGED PARTICLES AND NEUTRAL HYDROGEN. DURING THE CRUISE PHASE OF THE MISSION, THIS EXPERIMENT WAS USED TO SEARCH FOR THE SUPERSONIC TO SUBSONIC TRANSITION REGION IN THE SOLAR WIND. DURING THE JOVIAN ENCOUNTER, THIS EXPERIMENT WAS USED TO LOOK FOR EVIDENCE OF AN AURORAL OVAL ON THE JOVIAN DAYSIDE, TO FIND THE RATIO OF HYDROGEN TO HELIUM IN THE JOVIAN ATMOSPHERE, AND TO FIND THE TEMPERATURE OF THE OUTER PORTION OF THE JOVIAN ATMOSPHERE.

----- PIONEER 10, KINARD-----

INVESTIGATION NAME- METEOROID DETECTORS

NSSDC ID- 72-012A-04

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
INTERPLANETARY DUST

PERSONNEL

PI - W.H. KINARD
OI - R.E. TURNER
OI - J.M. ALVAREZ
OI - D.H. HUMES
OI - R.L. O'NEAL

NASA-LARC
NASA-MSFC
NASA-LARC
NASA-LARC
NASA-LARC

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO MEASURE THE NUMBER OF METEOROID IMPACTS ON THE PIONEER 10 SPACECRAFT BY MEANS OF 12 PANELS, EACH CONTAINING 18 PRESSURIZED CELLS, MOUNTED ON THE BACK OF THE ANTENNA DISK. THE TOTAL EXPOSED AREA WAS 0.465 SQ M. EACH PANEL OF GAS-FILLED CELLS CONSISTED OF A 2.54-E-5-M (1-MIL) THICK AND A 5.08-E-5-M (2-MIL) THICK SHEET OF STAINLESS STEEL WELDED TOGETHER IN SUCH A WAY THAT MANY SMALL POCKETS OF GAS WERE LEFT BETWEEN THEM. WHENEVER A POCKET WAS PUNCTURED, THE GAS ESCAPED AND A COLD CATHODE DEVICE DETECTED THE LOSS. THE RATE OF PRESSURE LOSS INDICATED THE SIZE OF THE HOLE MADE, AND THUS THE PARTICLE'S MASS AND INCIDENT ENERGY COULD BE DETERMINED. THE COMBINATION OF THESE DATA WITH TRAJECTORY DATA PROVIDED AN INDICATION OF THE SPATIAL DENSITY OF THE PARTICLES. THE 2.54-E-5-M THICK SIDE OF THE GAS PANEL WAS EXPOSED TO THE INTERPLANETARY MEDIUM, AND PENETRATIONS OF THE CELLS FROM THAT SIDE INDICATED ENCOUNTERS WITH PARTICLES HAVING MASSES OF 1 NANOGRAM OR MORE. SOME 300 TO 400 HITS WERE EXPECTED BY THE TIME THE SPACECRAFT COMPLETED ITS 200-DAY JOURNEY THROUGH THE ASTEROID BELT.

----- PIONEER 10, KLIORÉ-----

INVESTIGATION NAME- S-BAND OCCULTATION

NSSDC ID- 72-012A-10

INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.J. KLIORÉ	NASA-JPL
OI - G. FJELDSØ	NASA-JPL
OI - D.L. CAIN	NASA-JPL
OI - B.L. SEIDEL	NASA-JPL
OI - S.T. RASOOL	NASA HEADQUARTERS

BRIEF DESCRIPTION

THIS EXPERIMENT UTILIZED THE S-BAND (2292 MHZ, 8 W) SPACECRAFT RADIO TRANSMITTER SIGNAL CHARACTERISTICS TO OBTAIN INFORMATION ABOUT THE IONOSPHERES AND ATMOSPHERES OF JUPITER AND ITS SATELLITE IO. ENTRANCE INTO AND EXIT FROM JUPITER AND IO OCCULTATION, PROVIDED CHANGES IN THE SIGNAL CHARACTERISTICS FROM WHICH ATMOSPHERIC TEMPERATURE, PRESSURE, AND ELECTRON DENSITY PROFILES COULD BE CALCULATED. TEMPERATURE AND PRESSURE PROFILES WERE LIMITED TO LEVELS ABOVE THE PRESSURE OF ONE EARTH ATMOSPHERE. SIGNAL OCCULTATION ALSO PROVIDED A DETERMINATION OF THE PLANETARY DIAMETER.

----- PIONEER 10, McDONALD-----

INVESTIGATION NAME- COSMIC-RAY SPECTRA

NSSDC ID- 72-012A-12

INVESTIGATIVE PROGRAM
CODE SL/CO-OPINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - F.B. McDONALD	NASA-GSFC
OI - K.G. MCCracken	CSIRO
OI - W.R. WEBBER	U OF NEW HAMPSHIRE
OI - E.C. ROELOF	APPLIED PHYSICS LAB
OI - J.H. TRAINOR	NASA-GSFC
OI - B.J. TEEGARDEN	NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF THREE MULTI-ELEMENT SOLID-STATE TELESCOPES, ALL LOOKING NORMAL TO THE SPACECRAFT SPIN AXIS. THE HIGH-ENERGY TELESCOPE (HET) CONSISTED OF FIVE COLINEAR SENSORS AND MEASURED STOPPING PARTICLES ($Z = 1$ TO 8) IN THE ENERGY RANGE 20 TO 50 MEV/NUCLEON AND PENETRATING PARTICLES IN THE RANGE 50 TO 800 MEV/NUCLEON. CHARGE RESOLUTION FOR PENETRATING PARTICLES WAS POSSIBLE UP TO 200 MEV/NUCLEON. THE FIRST LOW-ENERGY TELESCOPE (LET-I) HAD FOUR ELEMENTS AND MEASURED STOPPING ($Z = 1$ TO 8) PARTICLES IN THE ENERGY RANGE 3 TO 32 MEV/NUCLEON. THE SECOND LOW-ENERGY TELESCOPE (LET-II) HAD THREE ELEMENTS AND MEASURED STOPPING ELECTRONS BETWEEN 50 AND 1000 KEV AND STOPPING PROTONS BETWEEN 50 KEV AND 20 MEV. FOR EACH TELESCOPE, COUNT RATES WERE OBTAINED FOR EACH OF SEVERAL SENSOR COINCIDENCE-ANTICOINCIDENCE MODES. SOME OF THE RATES FROM EACH TELESCOPE WERE SECTORED INTO EIGHT OCTANTS IN THE SPACECRAFT SPIN PLANE. IN ADDITION, THREE-SENSOR PULSE HEIGHT ANALYSIS, WITH PRIORITY SCHEMES FAVORING THE ANALYSIS OF HEAVIER PARTICLES, WAS ASSOCIATED WITH EACH TELESCOPE.

----- PIONEER 10, SIMPSON-----

INVESTIGATION NAME- CHARGED PARTICLE COMPOSITION

NSSDC ID- 72-012A-02

INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - J.A. SIMPSON	U OF CHICAGO
OI - J.J. O'GALLAGHER	U OF MARYLAND
OI - A. TUZULINO	U OF CHICAGO

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURED CHARGED-PARTICLE COMPOSITION AND SPECTRA USING FOUR DETECTOR SYSTEMS: (1) THE MAIN TELESCOPE, CONSISTING OF SEVEN ELEMENTS AND PROVIDING ENERGY SPECTRA (APPROXIMATELY 3 TO 68 MEV FOR PROTONS AND 10 TO 150 MEV/NUCL. FOR OXYGEN), ELEMENT RESOLUTION (THROUGH OXYGEN), AND ISOTOPE RESOLUTION (FOR H AND HE); (2) THE LOW-ENERGY SUBSYSTEM TELESCOPE, CONSISTING OF TWO ELEMENTS AND USING A VERY SMALL THIN FIRST ELEMENT TO EXTEND THE HIGH-SENSITIVITY PROTON MEASUREMENTS BELOW 1 MEV (0.3 TO 9 MEV) IN THE PRESENCE OF A HIGH GAMMA-RAY BACKGROUND ABOARD THE SPACECRAFT; (3) THE ELECTRON-CURRENT DETECTOR (OR EGG), CONSISTING OF A BERYLLIUM-SHIELD SILICON DETECTOR OPERATED IN CURRENT MODE TO MEASURE HIGH FLUXES OF ELECTRONS WITH ENERGIES ABOVE 3 MEV; AND (4) THE FISSION CELL DETECTOR, RECORDING FISSION FRAGMENTS FROM THE NUCLEON-INDUCED FISSION OF THORIUM 232 SANDWICHED BETWEEN TWO LARGE-AREA SILICON DETECTORS TO MEASURE FLUXES OF PROTONS (ABOVE 30 MEV) IN THE PRESENCE OF HIGH FLUXES OF ELECTRONS. THE EXPERIMENT SAMPLE TIME WAS SYNCHRONIZED WITH THE SPACECRAFT SPIN, PERMITTING SECTORING OF THE READOUT OF THE MAIN AND LOW-ENERGY TELESCOPES INTO EIGHT OCTANTS ABOUT THE SPIN AXIS.

----- PIONEER 10, SOBERMAN-----

INVESTIGATION NAME- ASTEROID/METEOROID ASTRONOMY

NSSDC ID- 72-012A-03

INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION DISCIPLINE(S)
ASTRONOMY
PLANETARY ATMOSPHERES
INTERPLANETARY DUST

PERSONNEL

PI - R.K. SOBERMAN	GENERAL ELECTRIC CO
OI - H.A. ZOOK	NASA-JSC

BRIEF DESCRIPTION

THE OVERALL OBJECTIVE OF THIS EXPERIMENT WAS TO INVESTIGATE DUST PARTICLES AND METEOROIDS IN INTERPLANETARY SPACE. IT WAS ESSENTIALLY TWO EXPERIMENTS, USING TWO DIFFERENT TECHNIQUES. ONE METHOD WAS TO DETECT PARTICLES BY THE REFLECTION OF LIGHT FROM THEM, AND THE OTHER METHOD WAS TO DETECT THEM BY THEIR IMPACTS. THE OBJECTIVES WERE TO DETERMINE DISTANCE, TRAJECTORY, VELOCITY, RELATIVE SIZE, AND FLUX OF PARTICLES RANGING IN SIZE FROM MINUTE PARTICLES A FEW METERS FROM THE TELESCOPE TO DISTANT ASTEROIDS. THE EQUIPMENT FOR THE DETECTION OF REFLECTION CONSISTED OF FOUR NON-IMAGING RITCHIEY-CHRETIEN TELESCOPES WITH PRIMARY MIRRORS OF 20-CM (8 IN.) DIAMETER, AND 25-CM (10 IN.) FOCAL LENGTH, FIELDS OF VIEW (FOV) OF 0.2 RAD (8 DEG) EACH, SECONDARY OPTICS, AND A PHOTOMULTIPLIER TUBE. THE LATTER DETECTS THE REFLECTED LIGHT COLLECTED BY THE TELESCOPE. AN EVENT WAS RECORDED WHEN AT LEAST THREE OF THE FOUR TELESCOPES SAW THE OBJECT. ENTRY AND DEPARTURE TIMES OF THE LIGHT ENABLED DETERMINATION OF RANGE AND VELOCITY. THE EQUIPMENT FOR THE IMPACT MODE CONSISTED OF 13 PANELS EACH CONTAINING 18 SEALED CELLS, PRESSURIZED WITH ARGON AND NITROGEN GAS, COVERING 0.65 SQ M (6.9 SQ FT) OF THE BACK OF THE MAIN ANTENNA DISH. PENETRATION BY A PARTICLE RESULTED IN LOSS OF GAS AT A RATE PROPORTIONAL TO THE HOLE, WHICH WOULD BE RELATED TO ITS MASS AND VELOCITY. PENETRATIONS WERE REGISTERED FROM PARTICLES AS SMALL AS 1-E-8 G.

----- PIONEER 10, VAN ALLEN-----

INVESTIGATION NAME- JOVIAN CHARGED PARTICLES

NSSDC ID- 72-012A-11

INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - J.A. VAN ALLEN	U OF IOWA
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BRIEF DESCRIPTION

THIS EXPERIMENT USED SEVEN MINIATURE GEIGER TUBES IN THREE ARRAYS TO MEASURE PROTON AND ELECTRON FLUXES IN INTERPLANETARY SPACE AND IN THE VICINITY OF JUPITER. DETECTOR GROUPINGS WERE AS FOLLOWS -- (1) A THREE-ELEMENT (A, B, AND C) DIFFERENTIALLY SHIELDED TELESCOPE, WITH TUBE C SHIELDED OMNIDIRECTIONALLY AND USED FOR BACKGROUND SUBTRACTION TO PROVIDE DIRECTIONAL RATES SUCH AS A-C (ELECTRONS OF 5-21 MEV AND PROTONS OF 30-77.5 MEV) AND B-C (ELECTRONS OF 0.55-21 MEV AND PROTONS OF 6.6-77.5 MEV). (2) A THREE-ELEMENT (D, E, AND F) TRIANGULAR ARRAY, EACH ELEMENT RESPONDING TO ELECTRONS ABOVE 31 MEV AND PROTONS ABOVE 77.5 MEV. AND (3) A THIN-WINDOW TUBE (G) WITH A GOLD-PLATED ELBOW AS THE APERTURE WHICH ADMITS SCATTERED ELECTRONS ABOVE 0.06 MEV WHILE DISCRIMINATING STRONGLY AGAINST PROTONS. SINGLE ELEMENT AND COINCIDENCE RATES WERE TELEMETERED FROM THE FIRST TWO TELESCOPES. THE TELEMETRY BIT RATE PREVAILING DURING THE JUPITER ENCOUNTER PERMITTED DIRECTIONAL SAMPLING IN INTERVALS OF ABOUT 14 DEG OF ROLL ABOUT THE SPIN AXIS. FOR FURTHER DETAILS SEE BAKER AND VAN ALLEN, 'J. GEOPHYS. RES.' 81, 617, 1976.

----- PIONEER 10, WEINBERG-----

INVESTIGATION NAME- ZODIACAL-LIGHT TWO-COLOR
PHOTOPOLARIMETRY

NSSDC ID- 72-012A-14

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
PLANETARY ATMOSPHERES
ZODIACAL LIGHT

PERSONNEL

PI - J.L. WEINBERG
OI - M.S. HANNER

STATE U OF NEW YORK
NASA-JPL

BRIEF DESCRIPTION

THE IMAGING PHOTOPOLARIMETER (IPP) EXPERIMENT WAS USED TO OBTAIN MAPS OF THE ZODIACAL LIGHT DISTRIBUTION IN TWO COLORS, BLUE (3900 TO 4900 Å) AND RED (5800 TO 7000 Å). IN EACH COLOR, THE MAPS WERE CONSTRUCTED OUT OF THE INTEGRATED-DETECTOR-RESPONSE (1/64 OF A ROLL PERIOD), SPIN-SCAN POINT-IMAGING DATA OBTAINED BY VIEWING THROUGH A 40- BY 40-MRAD SQ FIELD-STOP APERTURE. THIS WORK WAS PERFORMED DURING THE CRUISE PORTION OF THE MISSION. DETAILED SIMULTANEOUS RADIOMETRIC AND POLARIMETRIC MAPS OF BOTH SKY COLORS WERE MADE AS THE SPACECRAFT SWEEPED OUT A 360-DEG CLOCK ANGLE SWATH, AND THE TELESCOPE AND OPTICS WERE STEPPED IN CONE ANGLE (THE ANGLE BETWEEN SPACECRAFT SPIN AXIS AND THE TELESCOPE OPTICAL AXIS). AT EACH DISCRETE CONE ANGLE, A 20-ROLL MEASUREMENT CYCLE OCCURRED, CONSISTING OF 10 ROLLS FOR THE ACCUMULATION OF THE DATA AND FOR CALIBRATION, ALTERNATED WITH 10-ROLL PERIODS USED FOR THE TELEMETRY OF THE DATA. DURING A DATA ROLL, THE SIGNALS FROM FOUR DETECTORS (2/COLOR) WERE INTEGRATED OVER A TIME INTERVAL EQUAL TO 1/64 OF THE ROLL PERIOD. THE FOUR CHANNELS PROVIDED SIMULTANEOUS MEASUREMENTS AT TWO ORTHOGONAL POLARIZATION AZIMUTHS IN THE TWO SPECTRAL BANDS. THE POLARIZATION WAS SAMPLED PARALLEL AND PERPENDICULAR TO THE PLANE CONTAINING THE SPACECRAFT SPIN AXIS AND THE OPTICAL AXIS OF THE TELESCOPE. RADIOACTIVE CALIBRATION WAS PROVIDED BY A RADIOISOTOPE-ACTIVATED PHOSPHOR SOURCE. ALL SUCH DATA WERE FORMATTED TO PRODUCE A SKY MAP- 360 DEG IN CLOCK ANGLE BY 141 DEG IN CONE ANGLE. THE EXPERIMENTAL TRAIN FOR THE IPP PACKAGE CONSISTED OF THE FOLLOWING ELEMENTS: (1) A NEAR-DIFFRACTION-LIMITED 2.54-CM MAKSTOV CATADIOPTRIC TELESCOPE (F/3.4), (2) A FOCAL PLANE WHEEL CONTAINING FIELD-OF-VIEW APERTURES, DEPOLARIZERS, CALIBRATION SOURCE, ETC., (3) A WOLLASTON PRISM TO SPLIT LIGHT INTO TWO ORTHOGONALLY POLARIZED BEAMS, (4) A 45-DEG DICHROMATIC MIRROR THAT REFLECTED WAVELENGTHS LESS THAN 5500 Å (BLUE BEAM) AND TRANSMITTED ALL LIGHT OF GREATER WAVELENGTH (RED BEAM), (5) FOR EACH SPECTRAL BEAM (TWO POLARIZATIONS), A FILTERING COATED RELAY LENS AND FOLDING MIRRORS, AND (6) FOR EACH SPECTRAL BEAM, TWO BENDIX CHANNELTRON DETECTORS (BLUE - BIALKALI S-11 PHOTOCATHODES, RED-S-20 PHOTOCATHODES) TO REGISTER THE INTENSITY IN EACH POLARIZATION COMPONENT.

----- PIONEER 10, WOLFE-----

INVESTIGATION NAME- PLASMA

NSSDC ID- 72-012A-13

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - J.H. WOLFE
OI - L.A. FRANK
OI - R. LUST
OI - D.S. INTRILIGATOR
OI - D.D. MCKIBBIN
OI - V.T. ZAVIENTSEFF
OI - F.L. SCARF
OI - H.R. COLLARD
OI - W.C. FELDMAN
OI - Z.A. SMITH

NASA-ARC
U OF IOWA
MPI-HEADQUARTERS
U OF SOUTHERN CALIF
NASA-ARC
TRW SYSTEMS GROUP
NASA-ARC
LOS ALAMOS SCI LAB
NOAA-SEL

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTED OF DUAL 90 DEG QUADRISPHERICAL ELECTROSTATIC ANALYZERS, ONE WITH 26 INDIVIDUAL PARTICLE DETECTORS AND THE OTHER WITH 5 CURRENT COLLECTORS. THE SYSTEM WAS CAPABLE OF MEASURING INCIDENT PLASMA DISTRIBUTION PARAMETERS OVER THE ENERGY RANGE OF 0.1 TO 18 KEV FOR PROTONS AND APPROXIMATELY 1-500 EV FOR ELECTRONS. THE HIGH RESOLUTION ANALYZER WITH A COUNTOUT OF 9 KEV/Q PER KV APPLIED TO THE PLATES, HAD A MEAN PLATE RADIUS OF 9 CM AND SEPARATION OF 0.5 CM. THIS ANALYZER WAS USED TO MEASURE IONS ONLY AND HAD 26 CHANNELTRONS MOUNTED ON THE SEMICIRCULAR EXIT TO THE ANALYZER. THE APERTURE POINTED THROUGH A WIDE SLIT IN THE BACK OF THE SPACECRAFT HIGH-GAIN ANTENNA REFLECTOR AND POINTED ALONG THE SPIN AXIS TOWARD THE EARTH (AND THEREFORE THE SUN). THE EDGES OF THE ANTENNA REFLECTOR LIMITED THE VIEWING OF THE INSTRUMENT TO 73 DEG WITH RESPECT TO THE SPIN AXIS. THE CHANNELTRONS COVERED A RANGE OF PLUS OR MINUS 51 DEG. EACH CHANNELTRON NEAR THE CENTER COVERED 3 DEG AND APPROXIMATELY 8 DEG NEAR THE EDGES OF THE ANALYZER. THE ANGULAR WIDTH PERPENDICULAR TO THE LONG ANGULAR WIDTH WAS ABOUT 2 DEG. IN ONE HALF A SPIN PERIOD THE WHOLE CONE OF HALF ANGLE 51 DEG CENTERED ON THE SUN WAS SWEEPED OUT. A MEDIUM ENERGY ANALYZER WITH A MEAN RADIUS OF 12 CM AND A 1 CM PLATE SEPARATION (CONSTANT OF 6 KEV/Q PER KV APPLIED)

WAS USED TO DETECT BOTH IONS AND ELECTRONS. THE DETECTORS WERE FIVE FLAT-SURFACE CURRENT COLLECTORS. THE THREE CENTER COLLECTORS EACH COVERED 15 DEG AND COVERED THE ANGULAR RANGE OF PLUS OR MINUS 22.5 DEG FROM THE SPIN AXIS. THE TWO OUTSIDE COLLECTORS HAD AN ANGULAR WIDTH OF 47.5 DEG AND WERE LOCATED AT PLUS OR MINUS 46.25 DEG FROM THE CENTER OF THE ANALYZER. THERE WERE A VARIETY OF POSSIBLE OPERATING MODES FOR THE EXPERIMENT; HOWEVER, THE PRINCIPAL MODE UTILIZED DURING THE ENCOUNTER PHASE WAS ONE IN WHICH THE ANALYZER PLATE POTENTIAL WAS STEPPED THROUGH ITS RANGE EVERY ONE-HALF REVOLUTION OF THE SPACECRAFT AND ALL CURRENT COLLECTORS OR CHANNELTRONS WERE READ OUT AT THE PEAK FLUX ROLL ANGLE. THE HIGH-AND MEDIUM-RESOLUTION ANALYZERS OPERATED INDEPENDENTLY SO A CROSS-CHECK BETWEEN THESE ANALYZERS WAS POSSIBLE. THE DYNAMIC RANGE FOR THE PARTICLE FLUXES WAS FROM 1.0E+2 TO 3.0E+9/SQ CM-S AND THE PROTON TEMPERATURE DOWN TO 2.0E+3 DEG K COULD BE ASCERTAINED.

***** PIONEER 11*****

SPACECRAFT COMMON NAME- PIONEER 11
ALTERNATE NAMES- PIONEER-G, PL-733C
6421

NSSDC ID- 73-019A

LAUNCH DATE- 04/06/73 WEIGHT- 231. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- SATURN FLYBY

PERSONNEL

MG - F.D. KOCHENDORFER
SC - A.G. OPP
PM - C.F. HALL
PS - J.H. WOLFE

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-ARC
NASA-ARC

BRIEF DESCRIPTION

THIS WAS THE SECOND MISSION TO INVESTIGATE JUPITER AND THE OUTER SOLAR SYSTEM. PIONEER 11, LIKE PIONEER 10, USED JUPITER'S GRAVITATIONAL FIELD TO ALTER ITS TRAJECTORY RADICALLY. IT WILL PASS CLOSE TO SATURN IN SEPTEMBER 1979 AND THEN ESCAPE FROM THE SOLAR SYSTEM. THE SPACECRAFT WAS 2.9-M (9.5-FT) LONG AND CONTAINED A 2.74-M (9-FT) DIAMETER HIGH-GAIN ANTENNA OF ALUMINUM HONEYCOMB SANDWICH MATERIAL WHOSE FEED WAS TOPPED WITH A MEDIUM-GAIN ANTENNA. A LOW-GAIN, OMNI-ANTENNA WAS MOUNTED BELOW THE HIGH-GAIN DISH. IT CONTAINED TWO NUCLEAR ELECTRIC-POWER GENERATORS, WHICH GENERATED 144 W AT JUPITER, BUT WILL DECREASE TO 100 W AT SATURN. THERE WERE THREE REFERENCE SENSORS -- A STAR (CANOPUS) SENSOR, AND TWO SUN SENSORS. ATTITUDE POSITION COULD BE CALCULATED FROM THE REFERENCE DIRECTION TO EARTH AND THE SUN, WITH THE KNOWN DIRECTION TO CANOPUS AS BACKUP. PIONEER 11'S STAR SENSOR GAIN AND THRESHOLD SETTINGS WERE MODIFIED BASED ON EXPERIENCE FROM THAT OF PIONEER 10. THREE PAIRS OF ROCKET THRUSTERS PROVIDED SPIN AXIS CONTROL (AT 4.8 RPM) AND CHANGE OF THE SPACECRAFT VELOCITY. THE THRUSTERS COULD BE FIRED STEADILY OR PULSED, BY COMMAND. COMMUNICATIONS WERE MAINTAINED VIA THE OMNI- AND MEDIUM-GAIN ANTENNAS, WHICH OPERATED TOGETHER, CONNECTED TO ONE RECEIVER, WHILE THE HIGH-GAIN ANTENNA WAS CONNECTED TO THE OTHER RECEIVER. THE RECEIVERS COULD BE INTERCHANGED BY COMMAND. TWO RADIO TRANSMITTERS, COUPLED TO TWO TRAVELING WAVE TUBE AMPLIFIERS, PRODUCED 8 W POWER EACH IN S-BAND. COMMUNICATION UPLINK (EARTH TO SPACECRAFT) OPERATED AT 2110 MHZ, AND DOWNLINK (SPACECRAFT TO EARTH) AT 2292 MHZ. AT JUPITER'S DISTANCE, ROUND-TRIP COMMUNICATION TIME TOOK 92 MIN. DATA WERE RECEIVED AT THE DEEP SPACE NETWORK. THE SPACECRAFT WAS TEMPERATURE CONTROLLED TO BETWEEN -23 AND +38 DEG C (-10 TO +100 DEG F). AN ADDITIONAL EXPERIMENT, A LOW SENSITIVITY FLUXGATE MAGNETOMETER, WAS ADDED TO THE PIONEER 11 PAYLOAD. INSTRUMENTS STUDIED THE INTERPLANETARY AND PLANETARY MAGNETIC FIELDS; SOLAR WIND PROPERTIES; COSMIC RAYS; TRANSITION REGION OF THE HELIOSPHERE; NEUTRAL HYDROGEN ABUNDANCE; DISTRIBUTION, SIZE, MASS, FLUX, AND VELOCITY OF DUST PARTICLES; JOVIAN AURORAE; JOVIAN RADIO WAVES; PLANETS' AND SATELLITES' ATMOSPHERES; AND SURFACES OF JUPITER, SATURN, AND SOME OF THEIR SATELLITES. EQUIPMENT CARRIED FOR THESE EXPERIMENTS WERE -- MAGNETOMETER, PLASMA ANALYZER (FOR SOLAR WIND), CHARGED PARTICLE DETECTOR, IONIZING DETECTOR, NON-IMAGING TELESCOPES WITH OVERLAPPING FIELDS OF VIEW TO DETECT SUNLIGHT REFLECTED FROM PASSING METEORIODS, SEALED PRESSURIZED CELLS OF ARGON AND NITROGEN GAS FOR MEASURING PENETRATION OF METEORIODS, UV PHOTOMETER, IR RADIOMETER, AND AN IMAGING PHOTOPOLARIMETER, WHICH PRODUCED PHOTOGRAPHS AS WELL AS MEASURING THE POLARIZATION. FURTHER SCIENTIFIC INFORMATION WAS OBTAINED FROM THE CELESTIAL MECHANICS AND OCCULTATION PHENOMENA. THIS SPACECRAFT, LIKE PIONEER 10, CONTAINED PLAQUES THAT HAD DRAWINGS DEPICTING MAN, WOMAN, AND LOCATION OF THE SUN AND EARTH IN THE GALAXY. PIONEER 11 WAS 36,800 KM FROM JUPITER DURING ITS CLOSEST APPROACH.

----- PIONEER 11, ACUNA-----

INVESTIGATION NAME- JOVIAN MAGNETIC FIELD

NSSDC ID- 73-019A-14

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PLANETARY MAGNETIC FIELD

PERSONNEL

PI - M.H. ACUNA
OI - N.F. NESS

NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THIS INSTRUMENT, DESIGNED TO MEASURE THE JOVIAN MAGNETIC FIELD, CONSISTED OF A SINGLE-RANGE TRIAXIAL FLUXGATE MAGNETOMETER SENSOR AND ASSOCIATED ELECTRONICS CAPABLE OF MEASURING FIELDS FROM 1.E-6 TO 1.E-3 T (0.01 TO 10 GAUSS) ALONG EACH ORTHOGONAL AXIS. INSTANTANEOUS VECTOR MEASUREMENTS, USING A 10-BIT A-TO-D CONVERTER, YIELDED A QUANTIZATION STEP SIZE OF MINUS TO PLUS 600 NT FOR FIELDS LESS THAN 2.E-4 T. THESE ARE MADE ONCE EVERY THREE REVOLUTIONS OF THE SPACECRAFT (36 S) AND TRANSMITTED TO THE GROUND WITH NO FURTHER ON-BOARD PROCESSING. MORE INSTRUMENTAL DETAILS ARE GIVEN IN 'SP. SCI. INSTRUM.', 1, 177, 1975. PRINCIPAL SCIENTIFIC RESULTS CAN BE FOUND IN 'JGR,' 81, 2917, 1976.

----- PIONEER 11, ANDERSON-----

INVESTIGATION NAME- CELESTIAL MECHANICS

NSSDC ID- 73-019A-09

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY
ASTRONOMY
CELESTIAL MECHANICS

PERSONNEL

PI - J.D. ANDERSON
OI - G.W. NULL

NASA-JPL
NASA-JPL

BRIEF DESCRIPTION

TWO-WAY DOPPLER TRACKING OF THE SPACECRAFT WAS USED TO MAKE MORE PRECISE DETERMINATIONS OF PLANETARY MASSES, THE HELIOCENTRIC ORBIT OF JUPITER, AND THE GRAVITATIONAL FIELDS OF THE SUN, JUPITER, AND THE GALILEAN SATELLITES.

----- PIONEER 11, FILLIUS-----

INVESTIGATION NAME- JOVIAN TRAPPED RADIATION

NSSDC ID- 73-019A-05

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS
PLANETOLOGY

PERSONNEL

PI - R.W. FILLIUS
OI - C.E. MCILWAIN

U OF CALIF, SAN DIEGO
U OF CALIF, SAN DIEGO

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF AN ARRAY OF FIVE PARTICLE DETECTORS WITH ELECTRON THRESHOLDS IN THE RANGE .01 TO 35 MEV AND PROTON THRESHOLDS IN THE RANGE 0.15 TO 80 MEV. A CERENKOV COUNTER (C) HAD FOUR OUTPUT CHANNELS (C1, C2, C3, AND C4) SENSITIVE TO ELECTRONS HAVING ENERGIES ABOVE 5, 8, 12, AND 1 MEV, RESPECTIVELY. AN ELECTRON SCATTER COUNTER (E) HAD THREE OUTPUT CHANNELS (E1, E2, AND E3) SENSITIVE TO ELECTRONS ABOVE .16, .26, AND .46 MEV. A MINIMUM IONIZATION COUNTER (M) HAD THREE OUTPUT CHANNELS, M1 SENSITIVE TO ELECTRONS HAVING ENERGIES GREATER THAN 35 MEV, M2 THAT MEASURED BACKGROUND, AND M3 THAT WAS SENSITIVE TO PROTONS HAVING ENERGIES GREATER THAN 80 MEV. THE LAST TWO SENSORS WERE SCINTILLATOR DETECTORS (SP AND SE), BOTH OF WHICH HAD ENERGY THRESHOLDS OF 10 KEV FOR ELECTRONS AND 150 KEV FOR PROTONS. THE SENSITIVITY OF THE SE DETECTOR TO PROTONS WAS ABOUT A FACTOR OF 10 LOWER THAN ITS SENSITIVITY TO ELECTRONS. THUS, THE SEDC CHANNEL EFFECTIVELY MEASURED THE ELECTRON FLUX, WHICH COULD THEN BE SUBTRACTED FROM THE SPDC CHANNEL RESPONSE TO OBTAIN THE PROTON FLUX. SEVERAL OTHER CHANNELS LISTED ABOVE REQUIRED CORRECTIONS TO OBTAIN THE FLUXES OF THE SPECIES INDICATED. THE DETECTOR CHANNELS COULD BE PROGRAMMED FOR READ-OUT IN ANY ONE OF FOUR PATTERNS AT EACH OF THE EIGHT SPACECRAFT BIT RATE MODES. DURING ENCOUNTER WHEN THE SPACECRAFT WAS OPERATING IN THE HIGHEST BIT RATE MODE, THE MINIMUM TIME TO SAMPLE ONE CHANNEL WAS 1.5 S AND THE TIME TO OBTAIN A COMPLETE SCAN THROUGH ALL CHANNELS WAS 108 S. SINCE THE DIRECTIONAL DETECTORS POINTED PERPENDICULAR TO THE SPIN AXIS AND THE SPIN RATE WAS 5 RPM, PITCH ANGLE MEASUREMENTS WERE OBTAINED. WHILE THIS EXPERIMENT WAS PRIMARILY DESIGNED FOR ENCOUNTER STUDIES, SOME DATA WERE OBTAINED AT LOW RATES IN INTERPLANETARY SPACE. A DESCRIPTION OF THE INSTRUMENTATION AND INITIAL PIONEER 10 RESULTS WAS PUBLISHED IN JGR, 79, 3589, 1974.

----- PIONEER 11, GEHRELS-----

INVESTIGATION NAME- IMAGING PHOTOPOLARIMETER (IPP)

NSSDC ID- 73-019A-07

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL

PI - T. GEHRELS
OI - D.L. COFFEE
OI - J. HAMEEN-ANTILA
OI - C.E. KENNIGHT
OI - R.F. HUMMER
OI - M.G. TOMASKO
OI - W. SWINDELL

U OF ARIZONA
NASA-GISS
U OF ARIZONA
U OF ARIZONA
SANTA BARBARA RES CTR
U OF ARIZONA
U OF ARIZONA

BRIEF DESCRIPTION

THE IMAGING PHOTOPOLARIMETER (IPP) EXPERIMENT USED DURING JOVIAN ENCOUNTER MADE SIMULTANEOUS, TWO COLOR (BLUE - 3900 TO 4900 A, RED - 5800 TO 7000 A) POLARIMETRIC AND RADIOMETRIC MEASUREMENTS, AND MODERATE RESOLUTION (ABOUT 200 KM AT BEST) SPIN-SCAN IMAGES OF JUPITER AND THE JOVIAN SATELLITES. THE POLARIMETRIC AND RADIOMETRIC WORK WAS PERFORMED USING AN 8- BY 8-MRAD FIELD-STOP APERTURE, WHILE THE SPIN-SCAN IMAGING USED A 0.5- BY 0.5-MRAD APERTURE STOP. RELATIVE RADIOMETRIC CALIBRATION WAS DERIVED USING AN INTERNAL TUNGSTEN LAMP. LONG-TERM ABSOLUTE CALIBRATION OF THE INSTRUMENT WAS ACCOMPLISHED BY MEANS OF A SUNLIGHT DIFFUSOR/ATTENUATOR ELEMENT LOCATED IN THE SPACECRAFT ANTENNA STRUCTURE. PRIMARY RADIOMETRIC CALIBRATION WAS OBTAINED THROUGHOUT THE MISSION BY PERIODICALLY COMMANDING THE TELESCOPE TO VIEW THIS DIFFUSE BACKLIGHTED (SUNLIGHT) SOURCE. THE EXPERIMENTAL TRAIN FOR THE IPP PACKAGE CONSISTED OF THE FOLLOWING ELEMENTS -- (1) A NEAR-DIFFRACTION-LIMITED 2.54-CM MAKSUOTOV TELESCOPE OF FOCAL RATIO F/3.4, (2) A FOCAL PLANE WHEEL CONTAINING FOV APERTURES, DEPOLARIZERS, CALIBRATION SOURCE, ETC., (3) A WOLLASTON PRISM TO SPLIT THE LIGHT INTO TWO ORTHOGONALLY POLARIZED BEAMS, (4) A 45-DEG DICHROMATIC MIRROR THAT REFLECTS WAVELENGTHS OF LESS THAN 5500 A (BLUE BEAM) AND TRANSMITS ALL LIGHT OF GREATER WAVELENGTH (RED BEAM), (5) FOR EACH SPECTRAL BEAM (TWO POLARIZATIONS ARE SEPARATED) A FILTERING-COATED RELAY LENS AND FOLDING MIRRORS, AND (6) FINALLY, FOR EACH SPECTRAL BEAM TWO BENDIX CHANNELTRON (BLUE - BIALKALI S-11 PHOTOCATHODES, RED - S-20) PHOTOCATHODES TO REGISTER THE INTENSITY IN EACH POLARIZATION COMPONENT.

----- PIONEER 11, INGERSOLL-----

INVESTIGATION NAME- INFRARED RADIOMETER

NSSDC ID- 73-019A-08

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL

PI - A.P. INGERSOLL
OI - R.W. BOESE
OI - S.C. CHASE, JR.
OI - G. NEUGEBAUER
OI - L.M. TRAFTON

CALIF INST OF TECH
NASA-ARC
SANTA BARBARA RES CTR
CALIF INST OF TECH
U OF TEXAS, AUSTIN

BRIEF DESCRIPTION

THE PIONEER 11 INFRARED RADIOMETER EXPERIMENT MEASURED THE JOVIAN THERMAL BALANCE, TEMPERATURE DISTRIBUTION IN THE OUTER ATMOSPHERE, GENERAL SURFACE COMPOSITION, INCLUDING THE OVERALL HYDROGEN-TO-HELIUM RATIO, AND DARK SIDE TEMPERATURE. THE INSTRUMENT CONSISTED OF A 7.62-CM (3-IN.) REFLECTING CASSEGRAIN TELESCOPE WITH A 1-DEG BY 3-DEG FIELD-OF-VIEW THAT ILLUMINATES A PAIR OF 88-CHANNEL, THIN-FILM BIMETALLIC THERMOPILES IN TWO BANDS OF THE IR SPECTRUM (14 TO 25 MICROMETERS AND 19 TO 56 MICROMETERS) TO MEASURE THE IRRADIANCE. THE TWO-CHANNEL RADIOMETER WAS SIMILAR TO THOSE FLOWN ON MARINER 6 AND 7, BUT WAS MORE ACCURATE AND HAD BETTER SPATIAL RESOLUTION.

----- PIONEER 11, JUDGE-----

INVESTIGATION NAME- ULTRAVIOLET PHOTOMETRY

NSSDC ID- 73-019A-06

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
PLANETARY ATMOSPHERES
PLANETOLOGY
PARTICLES AND FIELDS

PERSONNEL
PI - D.L. JUDGE U OF SOUTHERN CALIF
OI - R.W. CARLSON U OF SOUTHERN CALIF

BRIEF DESCRIPTION

THIS EXPERIMENT, A BROADBAND PHOTOMETER SENSITIVE BETWEEN 200 AND 800 Å, OBSERVED EVIDENCE OF HELIUM, WHICH IN TURN INDICATED INTERACTIONS BETWEEN CHARGED PARTICLES AND NEUTRAL HYDROGEN. DURING THE CRUISE PHASE OF THE MISSION, THIS EXPERIMENT WAS USED TO SEARCH FOR THE SUPERSONIC TO SUBSONIC TRANSITION REGION IN THE SOLAR WIND. DURING THE JOVIAN ENCOUNTER, THIS EXPERIMENT WAS USED TO LOOK FOR EVIDENCE OF AN AURORAL OVAL ON THE JOVIAN DAYSIDE, TO FIND THE RATIO OF HYDROGEN TO HELIUM IN THE JOVIAN ATMOSPHERE, AND TO FIND THE TEMPERATURE OF THE OUTER PORTION OF THE JOVIAN ATMOSPHERE.

----- PIONEER 11, KINARD-----

INVESTIGATION NAME- METEOROID DETECTORS

NSSDC ID- 73-019A-04 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
ASTRONOMY
INTERPLANETARY DUST

PERSONNEL

PI - W.H. KINARD NASA-LARC
OI - J.M. ALVAREZ NASA-LARC
OI - D.H. HUMES NASA-LARC

BRIEF DESCRIPTION

THE PIONEER 11 METEOROID DETECTION EXPERIMENT ATTEMPTED TO DETECT THE DISTRIBUTION IN INTERPLANETARY SPACE OF METEOROIDS TOO SMALL TO BE SEEN BY LIGHT-SCATTERING TECHNIQUES. TWELVE PANELS, EACH CONTAINING 18 PRESSURIZED CELLS, WERE MOUNTED ON THE BACK OF THE SPACECRAFT ANTENNA DISH. THE PRESSURIZED CELLS CONSISTED OF A 5.08-E-5M-THICK STAINLESS STEEL OUTER LAYER WELDED TO A 2.54-E-5M-THICK STAINLESS STEEL INNER LAYER WITH A LARGE NUMBER OF SMALL POCKETS OF GAS TRAPPED BETWEEN THEM. LOSS OF GAS PRESSURE FROM ANY OF THE CELLS INDICATED A HIT, AND THE RATE OF GAS LOSS INDICATED THE SIZE OF THE HOLE MADE. THUS THE MASS AND INCIDENT ENERGY OF THE METEOROID PARTICLE COULD BE OBTAINED, AND WHEN COMBINED WITH THE TRAJECTORY DATA, ALLOWED THE SPATIAL DENSITY OF THE METEOROIDS TO BE DETERMINED. THE PANELS DETECTED IMPACTS WITH PARTICLES HAVING A MASS OF GREATER THAN 1.E-8 G. THE PANELS COVERED 0.46 SQ M. OF EXPOSED AREA ON PIONEER 11. RESULTS FROM THIS EXPERIMENT WERE COMBINED WITH THOSE FROM A SIMILAR EXPERIMENT FLOWN ON PIONEER 10 TO DETERMINE THE RANGE IN MASS OF SMALL PARTICLES ON BOTH THE INNER AND OUTER BOUNDRIES AND WITHIN THE ASTEROID BELT.

----- PIONEER 11, KLIOR-----

INVESTIGATION NAME- S-BAND OCCULTATION

NSSDC ID- 73-019A-10 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.J. KLIOR NASA-JPL
OI - G. FJELDBO NASA-JPL
OI - D.L. CAIN NASA-JPL
OI - B.L. SEIDEL NASA-JPL
OI - S.I. RASOOL NASA HEADQUARTERS

BRIEF DESCRIPTION

THIS EXPERIMENT UTILIZED THE S-BAND (2292 MHZ, 8 W) SPACECRAFT RADIO TRANSMITTER SIGNAL CHARACTERISTICS TO OBTAIN INFORMATION ABOUT THE IONOSPHERES AND ATMOSPHERES OF JUPITER AND ITS SATELLITE IO. ENTRANCE INTO AND EXIT FROM JUPITER AND IO OCCULTATION PROVIDED CHANGES IN THE SIGNAL CHARACTERISTICS FROM WHICH ATMOSPHERIC TEMPERATURE, PRESSURE, AND ELECTRON DENSITY PROFILES COULD BE CALCULATED. TEMPERATURE AND PRESSURE PROFILES WERE LIMITED TO LEVELS ABOVE THE PRESSURE OF ONE EARTH ATMOSPHERE. SIGNAL OCCULTATION ALSO PROVIDED A DETERMINATION OF THE PLANETARY DIAMETER.

----- PIONEER 11, McDONALD-----

INVESTIGATION NAME- COSMIC-RAY SPECTRA

NSSDC ID- 73-019A-12 INVESTIGATIVE PROGRAM
CODE SL/CO-OP
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - F.B. McDONALD NASA-GSFC
OI - K.G. MCCracken CSIRO
OI - W.R. WEBBER U OF NEW HAMPSHIRE
OI - E.C. ROELOF APPLIED PHYSICS LAB
OI - B.J. TEEGARDEN NASA-GSFC
OI - J.H. TRAINOR NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF THREE 3-ELEMENT TELESCOPES, ALL LOOKING NORMAL TO THE SPACECRAFT SPIN AXIS. A BIDIRECTIONAL TELESCOPE MEASURED 20- TO 800-MEV/NUCLEON PARTICLES WITH 5 TO 10 PERCENT ENERGY RESOLUTION. ANOTHER TELESCOPE MEASURED 3- TO 22-MEV/NUCLEON PARTICLES WITH 5 PERCENT RESOLUTION. THESE TWO TELESCOPES MEASURED PARTICLES WITH Z VALUES BETWEEN 1 AND 8. THE THIRD TELESCOPE MEASURED 50-KEV TO 1-MEV ELECTRONS AND 50-KEV TO 20-MEV PROTONS WITH 20 PERCENT RESOLUTION.

----- PIONEER 11, SIMPSON-----

INVESTIGATION NAME- CHARGED PARTICLE COMPOSITION

NSSDC ID- 73-019A-02 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - J.A. SIMPSON U OF CHICAGO
OI - J.J. O'GALLAGHER U OF MARYLAND
OI - A. TUZZOLINO U OF CHICAGO

BRIEF DESCRIPTION

THIS EXPERIMENT USED TWO TELESCOPES TO MEASURE THE COMPOSITION AND ENERGY SPECTRA OF SOLAR (AND GALACTIC) PARTICLES ABOVE ABOUT 0.5 MEV/NUCLEON. THE MAIN TELESCOPE CONSISTED OF FIVE COLINEAR ELEMENTS (THREE SOLID STATE, ONE CSI, AND ONE SAPPHIRE CERENKOV) SURROUNDED BY A PLASTIC ANTICOINCIDENCE SHIELD. THE TELESCOPE HAD A 60-DEG, FULL-ANGLE ACCEPTANCE CONE WITH ITS AXIS APPROXIMATELY NORMAL TO THE SPACECRAFT SPIN AXIS PERMITTING 8-SECTORED INFORMATION ON PARTICLE ARRIVAL DIRECTION. FOUR ELEMENTS OF THE MAIN TELESCOPE WERE PULSE-HEIGHT ANALYZED, AND LOW- AND HIGH-GAIN MODES COULD BE SELECTED BY COMMAND TO PERMIT RESOLUTION OF THE ELEMENTS H THROUGH NI OR OF THE ELECTRONS AND THE ISOTOPES OF H AND HE AND LIGHT NUCLEI. A SELECTION-PRIORITY SCHEME WAS INCLUDED TO PERMIT SAMPLING OF LESS ABUNDANT PARTICLE SPECIES UNDER NORMAL AND SOLAR-FLARE CONDITIONS. THE LOW-ENERGY TELESCOPE WAS ESSENTIALLY A TWO-ELEMENT, SHIELDED, SOLID-STATE DETECTOR WITH A 70-DEG, FULL-ANGLE ACCEPTANCE CONE. THE FIRST ELEMENT WAS PULSE-HEIGHT ANALYZED, AND DATA WERE RECORDED BY SECTORS.

----- PIONEER 11, SMITH-----

INVESTIGATION NAME- MAGNETIC FIELDS

NSSDC ID- 73-019A-01 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PLANETARY MAGNETIC FIELD
PARTICLES AND FIELDS

PERSONNEL

PI - E.J. SMITH NASA-JPL
OI - D.S. COLBURN NASA-ARC
OI - P. DYAL NASA-ARC
OI - C.P. SONETT U OF ARIZONA
OI - P.J. COLEMAN, JR. U OF CALIF, LA
OI - L. DAVIS, JR. CALIF INST OF TECH
OI - D.E. JONES BRIGHAM YOUNG U

BRIEF DESCRIPTION

THE MAGNETOMETER ON PIONEER 11 WAS A TRIAXIAL HELIUM MAGNETOMETER WITH SEVEN DYNAMIC RANGES, FROM PLUS OR MINUS 2.5 NT TO PLUS OR MINUS 1.0E-3 T. THE LINEARITY WAS 0.1 PERCENT, THE NOISE THRESHOLD WAS 0.01 NT RMS FOR 0-1 HZ. THE ACCURACY WAS 0.5 PERCENT OF FULL SCALE RANGE. THE EXPERIMENTER USED RTN COORDINATES IN HIS DATA ANALYSIS. IN THIS SYSTEM, R (OR X) IS RADially OUTWARD FROM THE SUN, T (OR Y) WAS PARALLEL TO THE SUN'S EQUATORIAL PLANE AND HAD ITS DIRECTION GIVEN BY THE CROSS PRODUCT OF THE SUN'S SPIN VECTOR INTO THE RADIAL DIRECTION (I.E., INTO R) AND N (OR Z) COMPLETED THE RIGHT HANDED ORTHOGONAL SYSTEM (POSITIVE NORTHWARD). A DETAILED INSTRUMENT DESCRIPTION MAY BE FOUND IN SMITH ET AL., 'IEEE TRANS. ON MAGNETICS,' VOL. M-11, P 962, JULY 1975.

----- PIONEER 11, VAN ALLEN-----

INVESTIGATION NAME- JOVIAN CHARGED PARTICLES

NSSDC ID- 73-019A-11 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - J.A. VAN ALLEN U OF IOWA

BRIEF DESCRIPTION

THIS EXPERIMENT USED SEVEN MINIATURE GEIGER TUBES IN THREE ARRAYS TO MEASURE PROTON AND ELECTRON FLUXES NEAR JUPITER. DETECTOR GROUPINGS ARE AS FOLLOWS -- (1) A THREE-ELEMENT (A, B AND C) DIFFERENTIALLY SHIELDED TELESCOPE. TUBE C IS SHIELDED OMNIDIRECTIONALLY AND IS USED FOR BACKGROUND SUBTRACTION TO PROVIDE RATES SUCH AS A-C (ELECTRONS OF 5 TO 21 MEV AND PROTONS OF 30 TO 77.5 MEV) AND B-C (ELECTRONS OF 0.55 TO 21 MEV AND PROTONS OF 6.6 TO 77.5 MEV). (2) A THREE-ELEMENT TRIANGULAR ARRAY, EACH ELEMENT RESPONDING TO ELECTRONS ABOVE 31 MEV AND PROTONS ABOVE 77.5 MEV, (3) A THIN-WINDOW TUBE (G) WITH A GOLD-PLATED ELBOW AS THE ENTRANCE APERTURE TO ADMIT SCATTERED ELECTRONS ABOVE 0.06 MEV WHILE DISCRIMINATING STRONGLY AGAINST PROTONS. FOR A DESCRIPTION OF THE SIMILAR EXPERIMENT ON PIONEER 10 SEE VAN ALLEN ET AL., JGR, 79, 3395, 1974. EARLY RESULTS ARE GIVEN IN SCIENCE, 188, 459, 1975.

----- PIONEER 11, WOLFE-----

INVESTIGATION NAME- PLASMA

NSSDC ID- 73-019A-13

INVESTIGATIVE PROGRAM
CODE SL/CO-OPINVESTIGATION DISCIPLINE(S)
SPACE PLASMA
PARTICLES AND FIELDS

PERSONNEL

PI - J.H. WOLFE	NASA-ARC
OI - L.A. FRANK	U OF IOWA
OI - R. LUST	MPI-HEADQUARTERS
OI - D.S. INTRILIGATOR	U OF SOUTHERN CALIF
OI - V.T. ZAVIENTSEFF	NASA-ARC
OI - Z.A. SMITH	NOAA-SEL
OI - F.L. SCARF	TRW SYSTEMS GROUP
OI - H.R. COLLARD	NASA-ARC
OI - W.C. FELDMAN	LOS ALAMOS SCI LAB
OI - D.D. MCKIBBIN	NASA-ARC

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTED OF DUAL 90 DEG QUADRISPHERICAL ELECTROSTATIC ANALYZERS, ONE WITH 26 INDIVIDUAL PARTICLE DETECTORS AND THE OTHER WITH 5 CURRENT COLLECTORS. THE SYSTEM WAS CAPABLE OF MEASURING INCIDENT PLASMA DISTRIBUTION PARAMETERS OVER THE ENERGY RANGE OF 0.1 TO 18 KEV FOR PROTONS AND APPROXIMATELY 1-500 EV FOR ELECTRONS. THE HIGH RESOLUTION ANALYZER WITH A COUNTOUT OF 9 KEV/Q PER KV APPLIED TO THE PLATES, HAD A MEAN PLATE RADIUS OF 9 CM AND SEPARATION OF 0.5 CM. THIS ANALYZER WAS USED TO MEASURE IONS ONLY AND HAD 26 CHANNELTRONS MOUNTED ON THE SEMICIRCULAR EXIT TO THE ANALYZER. THE APERTURE POINTED THROUGH A WIDE SLIT IN THE BACK OF THE SPACECRAFT HIGH-GAIN ANTENNA REFLECTOR AND POINTED ALONG THE SPIN AXIS TOWARD THE EARTH (AND THEREFORE THE SUN). THE EDGES OF THE ANTENNA REFLECTOR LIMITED THE VIEWING OF THE INSTRUMENT TO 73 DEG WITH RESPECT TO THE SPIN AXIS. THE CHANNELTRONS COVERED A RANGE OF PLUS OR MINUS 51 DEG. EACH CHANNELTRON NEAR THE CENTER COVERED 3 DEG AND APPROXIMATELY 8 DEG NEAR THE EDGES OF THE ANALYZER. THE ANGULAR WIDTH PERPENDICULAR TO THE LONG ANGULAR WIDTH WAS ABOUT 2 DEG. IN ONE HALF A SPIN PERIOD THE WHOLE CONE OF HALF ANGLE 51 DEG CENTERED ON THE SUN WAS SWEEPED OUT. A MEDIUM ENERGY ANALYZER WITH A MEAN RADIUS OF 12 CM AND A 1 CM PLATE SEPARATION (CONSTANT OF 6 KEV/Q PER KV APPLIED) WAS USED TO DETECT BOTH IONS AND ELECTRONS. THE DETECTORS WERE FIVE FLAT-SURFACE CURRENT COLLECTORS. THE THREE CENTER COLLECTORS EACH COVERED 15 DEG AND COVERED THE ANGULAR RANGE OF PLUS OR MINUS 22.5 DEG FROM THE SPIN AXIS. THE TWO OUTSIDE COLLECTORS HAD AN ANGULAR WIDTH OF 47.5 DEG AND WERE LOCATED AT PLUS OR MINUS 46.25 DEG FROM THE CENTER OF THE ANALYZER. THERE WERE A VARIETY OF POSSIBLE OPERATING MODES FOR THE EXPERIMENT; HOWEVER, THE PRINCIPAL MODE UTILIZED DURING THE ENCOUNTER PHASE WAS ONE IN WHICH THE ANALYZER PLATE POTENTIAL WAS STEPPED THROUGH ITS RANGE EVERY ONE-HALF REVOLUTION OF THE SPACECRAFT AND ALL CURRENT COLLECTORS OR CHANNELTRONS WERE READ OUT AT THE PEAK FLUX ROLL ANGLE. THE HIGH AND MEDIUM RESOLUTION ANALYZERS OPERATED INDEPENDENTLY SO A CROSS CHECK BETWEEN THESE ANALYZERS WAS POSSIBLE. THE DYNAMIC RANGE FOR THE PARTICLE FLUXES WAS FROM 1.0×10^2 TO 3.0×10^9 SQ CM-S AND THE PROTON TEMPERATURE DOWN TO 2.0×10^3 DEG K COULD BE ASCERTAINED.

***** PIONEER VENUS 1*****

SPACECRAFT COMMON NAME- PIONEER VENUS 1
ALTERNATE NAMES- PIONEER VENUS 1978 ORBIT, 10911
PIONEER VENUS ORBITER

NSSDC ID- 78-051A

LAUNCH DATE- 05/20/78 WEIGHT- 517. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS-CENT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- VENUSCENTRIC
ORBIT PERIOD- 1440. MIN
PERIAPSIS- 200. KM ALT

EPOCH DATE- 12/04/78
INCLINATION- 105. DEG
APOAPSIS- 66614. KM ALT

PERSONNEL

MG - F.D. KOCHENDORFER	NASA HEADQUARTERS
SC - R.E. MURPHY	NASA HEADQUARTERS
PM - C.F. HALL	NASA-ARC
PS - L. COLIN	NASA-ARC

BRIEF DESCRIPTION

PIONEER VENUS 1 WAS THE FIRST OF TWO MISSIONS TO CONDUCT A COMPREHENSIVE INVESTIGATION OF VENUS' ATMOSPHERE. THE SPACECRAFT WAS A SOLAR-POWERED CYLINDER ABOUT 250 CM IN DIAMETER WHOSE SPIN AXIS WAS SPIN-STABILIZED PERPENDICULAR TO THE ECLIPTIC PLANE. A HIGH-GAIN ANTENNA WAS MECHANICALLY DESPUN TO REMAIN FOCUSED ON THE EARTH. THE INSTRUMENTS WERE MOUNTED ON A SHELF WITHIN THE SPACECRAFT EXCEPT FOR A MAGNETOMETER MOUNTED AT THE END OF A BOOM TO INSURE AGAINST MAGNETIC INTERFERENCE FROM THE SPACECRAFT. PIONEER VENUS 1 WAS TO MEASURE THE DETAILED STRUCTURE OF VENUS' UPPER ATMOSPHERE AND IONOSPHERE, INVESTIGATE THE INTERACTION OF THE SOLAR WIND WITH VENUS' IONOSPHERE AND THE MAGNETIC FIELD IN THE VICINITY OF THE PLANET, DETERMINE THE CHARACTERISTICS OF THE ATMOSPHERE AND SURFACE OF VENUS ON A PLANETARY SCALE, DETERMINE THE PLANET'S GRAVITATIONAL FIELD HARMONICS FROM PERTURBATIONS OF THE SPACECRAFT ORBIT, AND DETECT GAMMA-RAY BURSTS.

----- PIONEER VENUS 1, BRACE-----

INVESTIGATION NAME- LANGMUIR PROBE

NSSDC ID- 78-051A-01

INVESTIGATIVE PROGRAM
CODE SL/CO-OPINVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
PLANETARY IONOSPHERES

PERSONNEL

PI - L.H. BRACE	NASA-GSFC
OI - M.B. MCELROY	HARVARD U
OI - A. PEDERSEN	ESA-ESTEC
OI - A.F. NAGY	U OF MICHIGAN
OI - T.M. DONAHUE	U OF MICHIGAN

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A PAIR OF CYLINDRICAL LANGMUIR PROBES OF THE TYPE BEING USED ON AE. TWO PROBES WERE REQUIRED, SO THAT ONE WAS ALWAYS OUT OF THE WAKE OF THE SPACECRAFT. IN FLIGHT ANALYSIS, 56 MEASUREMENTS TAKEN AT A RATE OF ONE PER SECOND PROVIDED HIGH SPATIAL RESOLUTION FOR THE MEASUREMENTS OF NE AND TE. THE RESULTS OF THESE HIGH-RESOLUTION MEASUREMENTS WERE USED BOTH TO STUDY THE UPPER ATMOSPHERE AND IONOSPHERE AND TO INVESTIGATE THE INTERACTION OF THE SOLAR WIND WITH THE VENUSIAN IONOSPHERE. THIS EXPERIMENT PROVIDED MEASUREMENTS OVER THE WHOLE REGION TRAVERSED BY THE ORBITER, COVERING A LARGE RANGE OF SOLAR ASPECT ANGLES, TO YIELD A MORE COMPLETE CONFIGURATION OF THE PHYSICAL PROPERTIES OF THE IONOPAUSE REGION.

----- PIONEER VENUS 1, CROFT-----

INVESTIGATION NAME- RADIO SCIENCE TEAM

NSSDC ID- 78-051A-03

INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION DISCIPLINE(S)
GEODESY AND CARTOGRAPHY
PLANETARY IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL

TL - T.A. CROFT	SRI INTERNATIONAL
TM - G.M. KEATING	NASA-LARC
TM - A.J. KLIROE	NASA-JPL
TM - R. PHILLIPS	NASA-JPL
TM - I.I. SHAPIRO	MASS INST OF TECH
TM - R. WOO	NASA-JPL

BRIEF DESCRIPTION

THE RADIO SCIENCE TEAM HAD THE RESPONSIBILITY FOR PLANNING, COORDINATING, AND RECOMMENDING SCIENTIFIC USES OF RADIO SIGNALS, EXECUTING APPROVED EXPERIMENTS, AND CONDUCTING THE DATA ANALYSIS REQUIRED. MAJOR FIELDS OF INTEREST INCLUDED THE GRAVITY FIELD OF VENUS, VERTICAL STRUCTURE OF THE DAYTIME AND NIGHTTIME IONOSPHERES, NEUTRAL ATMOSPHERE TEMPERATURE, PRESSURE AND DENSITY, HORIZONTAL GRADIENTS OF ATMOSPHERIC PROPERTIES, AND SMALL-SCALE TURBULENCE IN THE ATMOSPHERE.

----- PIONEER VENUS 1, DONAHUE-----

INVESTIGATION NAME- PARTICIPATING THEORIST DONAHUE

NSSDC ID- 78-051A-04

INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION DISCIPLINE(S)
AERONOMY
IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL
PI - T.M. DONAHUE

U OF MICHIGAN

BRIEF DESCRIPTION

THIS INVESTIGATION COMBINED RESULTS OBTAINED FROM THE ORBITER MISSION WITH RESULTS FROM THE MULTI-PROBE MISSION TO OBTAIN A UNIFIED PICTURE OF THE ATMOSPHERIC AND IONOSPHERIC CHEMISTRY AND TRANSPORT PROCESSES OCCURRING IN THE ATMOSPHERE OF VENUS.

----- PIONEER VENUS 1, EVANS-----

INVESTIGATION NAME- TRANSIENT GAMMA-RAY SOURCES

NSSDC ID- 78-051A-05

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL

PI - W.D. EVANS	LOS ALAMOS SCI LAB
OI - J.P. CONNER	LOS ALAMOS SCI LAB
OI - P.R. HIGBIE	LOS ALAMOS SCI LAB
OI - R.W. KLEBESADEL	LOS ALAMOS SCI LAB
OI - R.A. OLSON	LOS ALAMOS SCI LAB
OI - I.B. STRONG	LOS ALAMOS SCI LAB
OI - R.E. SPALDING	SANDIA LABORATORIES

BRIEF DESCRIPTION

AN OMNIDIRECTIONAL GAMMA-RAY DETECTOR EMPLOYING TWO PHOSPHOR SCINTILLATION SPECTROMETERS SENSITIVE TO PROTONS FROM 0.2 TO 2.0 MEV WERE USED WITH LOGIC CIRCUITRY TO DETECT THE BEGINNING OF A GAMMA EVENT AND TO INITIATE A PERIOD OF RAPID DATA COLLECTION. DATA WERE STORED IN A MEMORY UNIT FOR SUBSEQUENT TRANSMISSION TO EARTH. CONFIRMATION THAT A TRUE GAMMA EVENT HAD OCCURRED WAS OBTAINED BY COMPARISON WITH RESULTS FROM OTHER EXPERIMENTS IN EARTH SATELLITES. THIS EXPERIMENT PROVIDED THE LONG BASELINE TIME CORRELATIONS NECESSARY FOR CALCULATING ACCURATE SOURCE LOCATIONS.

----- PIONEER VENUS 1, HANSEN-----

INVESTIGATION NAME- CLOUD PHOTOPOLARIMETER

NSSDC ID- 78-051A-06

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - J.E. HANSEN	NASA-GISS
OI - P.H. STONE	MASS INST OF TECH
OI - A.A. LACIS	NASA-GISS
OI - D.L. COFFEEN	NASA-GISS
OI - L. TRAVIS	NASA-GISS

BRIEF DESCRIPTION

THIS EXPERIMENT USED A SIMPLIFIED VERSION OF THE IMAGING PHOTOPOLARIMETER FLOWN ON PIONEER 10 AND 11 TO PROVIDE LOW-RESOLUTION, FOUR-COLOR MAPS OF THE VENUSIAN CLOUD COVER WITH A HIGH-RESOLUTION IMAGING CAPABILITY NEAR APOCENTER. THE PRINCIPAL OBJECTIVE OF THIS INVESTIGATION WAS TO DETERMINE THE PROPERTIES OF THE CLOUDS AND HAZE, INCLUDING THE VERTICAL AND HORIZONTAL DISTRIBUTION OF THE PARTICLES, CLOUD PARTICLE SIZE AND REFRACTIVE INDEX, THE CLOUD-TOP HEIGHT, AND THE NUMBER DENSITY OF PARTICLES.

----- PIONEER VENUS 1, KNUDSEN-----

INVESTIGATION NAME- RETARDING POTENTIAL ANALYZER

NSSDC ID- 78-051A-07

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
PLANETARY IONOSPHERES

PERSONNEL

PI - W.C. KNUDSEN	LOCKHEED PALO ALTO
OI - K. SPENNER	INST FUR PHYS WELTRAUM
OI - R.C. WHITTEN	NASA-ARC

BRIEF DESCRIPTION

THIS INVESTIGATION USED A LANGMUIR-PROBE RETARDING-POTENTIAL ANALYZER DESIGNED TO MEASURE ELECTRON CONCENTRATION AND TEMPERATURE, MAJOR ION CONCENTRATIONS AND TEMPERATURES, ION DRIFT VELOCITIES, AND THE ENERGY DISTRIBUTION FUNCTION OF AMBIENT PHOTOELECTRONS. IT WAS AN ADAPTATION OF THE INSTRUMENT FLOWN ON THE GERMAN AEROS SATELLITE IN 1972. EITHER ONE OF TWO SENSOR HEADS COULD HAVE BEEN USED, EACH CONSISTING OF A MULTIGRID CUP AND ELECTROMETER, WHICH COULD OPERATE IN ELECTRON, ION, OR PHOTOELECTRON MODES, INITIATED BY SPACECRAFT ROLL PULSES. THE MEASUREMENTS TAKEN WHEN THE SENSOR AXIS WAS CLOSEST TO THE PLASMA FLOW VELOCITY VECTOR ARE TRANSMITTED. THE AIMS OF THE INVESTIGATION WERE TO IMPROVE KNOWLEDGE OF THE IMPORTANT IONIC REACTIONS IN THE VENUSIAN IONOSPHERE, TO STUDY THE PLASMA TRANSPORT PROCESSES TO DETERMINE IF VENUS HAS A POLAR WIND, TO STUDY THE PROCESSES AT THE SOLAR WIND-IONOSPHERE BOUNDARY, AND TO STUDY SIMILAR AIMS CONCERNING THE AMBIENT ELECTRON POPULATION.

----- PIONEER VENUS 1, MASURSKY-----

INVESTIGATION NAME- PARTICIPATING THEORIST MASURSKY

NSSDC ID- 78-051A-08

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
GEODESY AND CARTOGRAPHY
PLANETOLOGY

PERSONNEL

PI - H. MASURSKY

US GEOLOGICAL SURVEY

BRIEF DESCRIPTION

SURFACE PROFILE, ROUGHNESS, AND ELECTRICAL PROPERTIES DATA FROM THE PIONEER VENUS RADAR ALTIMETER WERE ANALYZED IN CONJUNCTION WITH SPACECRAFT-DERIVED GRAVITY INFORMATION AND EARTH-BASED RADAR BACKSCATTER DATA TO PRODUCE A SERIES OF CARTOGRAPHIC AND GEOLOGIC MAPS. THE INITIAL MAPS INCLUDED GEOMETRIC ARRAYS OF RADAR PROFILES AND TOPOGRAPHIC CONTOUR DATA. THESE WERE THEN UTILIZED TO PRODUCE A SHADED RELIEF CARTOGRAPHIC MAP, SCALE 1 TO 25 MILLION, WITH SUPERIMPOSED CONTOUR INFORMATION. PRELIMINARY VENUSIAN GEOLOGIC INFORMATION, INFERRED FROM ALL AVAILABLE SPACECRAFT AND EARTH-BASED RADAR DATA SOURCES, WILL SUBSEQUENTLY BE ADDED TO THE CARTOGRAPHIC MAP BASE TO PRODUCE GEOLOGIC MAPS. IT IS ANTICIPATED THAT ONE TO THREE LARGER SCALE (1 TO 5 MILLION) CARTOGRAPHIC AND GEOLOGIC MAPS OF SCIENTIFICALLY INTERESTING VENUS SURFACE FEATURES ALSO WILL BE PRODUCED.

----- PIONEER VENUS 1, MCGILL-----

INVESTIGATION NAME- PARTICIPATING THEORIST MCGILL

NSSDC ID- 78-051A-09

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY

PERSONNEL

PI - G.E. MCGILL

U OF MASSACHUSETTS

BRIEF DESCRIPTION

INVESTIGATIONS OF THE TOPOGRAPHY AND GEOLOGY OF VENUS WERE UNDERTAKEN TO ASSURE CORRECT RECOGNITION OF TOPOGRAPHIC AND MATERIAL CHARACTERISTICS OF THE PLANET AND TO ARRIVE AT THE GEOLOGICAL AND GEOPHYSICAL INTERPRETATION OF THESE CHARACTERISTICS.

----- PIONEER VENUS 1, NAGY-----

INVESTIGATION NAME- PARTICIPATING THEORIST NAGY

NSSDC ID- 78-051A-10

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
AERONOMY
PLANETARY IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.F. NAGY

U OF MICHIGAN

BRIEF DESCRIPTION

INVESTIGATIONS OF THE IONOSPHERE OF VENUS WERE OPTIMIZED BY EXTENDING CURRENT MODELS AND FORMULATING A MISSION PLAN BEST SUITED TO ADDRESS TOPICS INCLUDING THE PHYSICS OF THE SOLAR WIND-IONOSPHERE INTERACTION, ENERGETICS OF THE UPPER ATMOSPHERE, ION CHEMISTRY, AND THE PROCESSES RESPONSIBLE FOR THE GENERAL STRUCTURE OF THE IONOSPHERE, INCLUDING MECHANISMS RESPONSIBLE FOR THE MAINTENANCE OF THE NIGHTTIME IONOSPHERE.

----- PIONEER VENUS 1, NIEMANN-----

INVESTIGATION NAME- NEUTRAL PARTICLE MASS SPECTROMETER

NSSDC ID- 78-051A-11

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
AERONOMY
PLANETARY ATMOSPHERES

PERSONNEL

PI - H.B. NIEMANN	NASA-GSFC
OI - G.R. CARIGNAN	U OF MICHIGAN
OI - R.E. HARTLE	NASA-GSFC
OI - N.W. SPENCER	NASA-GSFC

BRIEF DESCRIPTION

THE EXPERIMENT USED A QUADRUPOLE MASS SPECTROMETER WITH THREE ION SOURCE OPERATING MODES AND THREE MASS SCANNING MODES. THE ION SOURCE COULD BE OPERATED ALTERNATELY IN OPEN AND CLOSED CONFIGURATIONS TO INCREASE ACCURACY. AN ADAPTIVE MASS SCAN WAS USED TO REDUCE THE BIT RATE REQUIRED FOR A GIVEN INFORMATION RETURN RATE. THE RESOLUTION WAS 1×10^{-4} FOR ADJACENT MASSES, AND THE MASS RANGE WAS 1 TO 45 U. VERTICAL AND HORIZONTAL DENSITY VARIATIONS OF THE MAJOR NEUTRAL CONSTITUENTS OF THE UPPER ATMOSPHERE OF VENUS WERE DETECTED AND MEASURED TO DEFINE THE DYNAMIC, CHEMICAL, AND THERMAL STATES OF THE UPPER ATMOSPHERE. IMPORTANT CONSTITUENTS MEASURED WERE HE, O, O₂, CO, CO₂ AND/OR

N2, AND A. IT WAS ALSO POSSIBLE TO STUDY H, D AND/OR H2, C, AND NO.

----- PIONEER VENUS 1, PETTENGILL-----

INVESTIGATION NAME- RADAR ALTIMETER

NSSDC ID- 78-051A-02

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
GEODESY AND CARTOGRAPHY
PLANETOLOGY

PERSONNEL

PI - G.	PETTENGILL	MASS INST OF TECH
O1 - W.E.	BROWN, JR.	NASA-JPL
O1 - W.M.	KAULA	U OF CALIF, LA
O1 - D.H.	STAELEN	MASS INST OF TECH

BRIEF DESCRIPTION

A RADAR ALTIMETER WAS USED TO OBTAIN INFORMATION ON THE ORBITER ALTITUDE, PLANETARY SURFACE TEMPERATURE, AND RADAR SCATTERING PROPERTIES IN ORDER TO INFER THE SURFACE TOPOGRAPHY, GEOLOGY, AND THE THERMAL AND MECHANICAL PROPERTIES OF THE INTERIOR OF VENUS. THE WEIGHT OF THE INSTRUMENT WAS 9.0 KG (20 LB), AND THE POWER CONSUMPTION WAS 25 W.

----- PIONEER VENUS 1, RUSSELL-----

INVESTIGATION NAME- TRIAXIAL FLUXGATE MAGNETOMETER

NSSDC ID- 78-051A-12

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS
ATMOSPHERIC PHYSICS

PERSONNEL

PI - C.T.	RUSSELL	U OF CALIF, LA
O1 - P.J.	COLEMAN, JR.	U OF CALIF, LA
O1 - F.V.	CORONITI	U OF CALIF, LA
O1 - C.F.	KENNEL	U OF CALIF, LA
O1 - R.L.	MCPHERRON	U OF CALIF, LA
O1 - G.L.	SISCOE	U OF CALIF, LA

BRIEF DESCRIPTION

THIS EXPERIMENT USED A TRIAXIAL FLUXGATE MAGNETOMETER WITH TWO RING CORE SENSORS AT THE END OF A MAGNETOMETER BOOM AND ONE RING CORE SENSOR, AT 45 DEG TO THE SPIN AXIS, HALFWAY DOWN THE BOOM. THE DRIVE AND ELECTRONICS DESIGN HAS BEEN USED ON THE APOLLO 15 AND 16 SUBSATELLITES. THE OBJECTIVES WERE TO DETERMINE ANY PLANETARY AND REMANENT MAGNETIC FIELDS, TO DEDUCE THE LOCATION AND STRENGTH OF IONOSPHERIC CURRENT SYSTEM, TO DETERMINE THE ENERGY AND MASS BALANCE IN THE UPPER ATMOSPHERE OF VENUS, TO DETERMINE THE NATURE OF THE SOLAR WIND INTERACTION WITH VENUS, AND TO STUDY THE NEAR-WAKE REGION OF VENUS AND THE STRUCTURE OF THE VENUSIAN BOW SHOCK. INTERPLANETARY OBJECTIVES WERE TO DETERMINE THE PERTURBATION OF THE NEAR-PLANET REGION BY VENUS AND TO COMPARE THE PROPERTIES OF THE AVERAGE FIELD AT 0.7 AND 1.0 AU. THE INSTRUMENT WAS INTENDED TO, IN THE WORST CASE OF LOW-BIT AND LOW-SAMPLE RATES, MEASURE ONE VECTOR PER 32 S. WHILE IN VENUS ORBIT, WHEN THE SPACECRAFT WAS COASTING THROUGH THE INTERPLANETARY REGION IN THE APOAPSIS MODE, THE SAMPLE RATE WAS ONE VECTOR PER 8 SEC. WHILE THE SPACECRAFT WAS PASSING THROUGH THE VENUSIAN IONOSPHERE IN THE PERIAPSIS MODE, THE SAMPLE RATE WAS FOUR VECTORS PER S.

----- PIONEER VENUS 1, SCARF-----

INVESTIGATION NAME- ELECTRIC FIELD DETECTOR

NSSDC ID- 78-051A-13

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - F.L.	SCARF	TRW SYSTEMS GROUP
O1 - I.M.	GREEN	TRW SYSTEMS GROUP

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A MODIFIED VERSION OF THE PIONEER 8 AND PIONEER 9 EXPERIMENTS TO MEASURE THE ELECTRIC FIELD COMPONENTS IN FOUR 30 PERCENT NARROW BAND CHANNELS CENTERED AT 100, 730, 7350, AND 30,000 HZ. THE AIMS OF THE INVESTIGATION WERE TO PERFORM THE FIRST ANALYSIS OF VLF ELECTRIC FIELDS AT VENUS TO ELUCIDATE THE PLASMA INTERACTIONS BETWEEN THE SOLAR WIND AND THE IONOSPHERIC OR EXOSPHERIC PLASMA. THE ROLE OF PLASMA INSTABILITIES IN MODIFYING THE HEATFLUX FROM THE SOLAR WIND AND IN THERMALIZING NEWLY BORN IONS FROM VENUS WERE ALSO STUDIED. A SELF-CONTAINED BALANCED V-TYPE ANTENNA WITH A DIFFERENTIAL PREAMPLIFIER WAS EMPLOYED TO MAKE THE MEASUREMENTS. AT THE 512-BIT-PER-S SATELLITE MODE, ONE FREQUENCY SCAN PER S WAS OBTAINED.

----- PIONEER VENUS 1, SCHUBERT-----

INVESTIGATION NAME- PARTICIPATING THEORIST SCHUBERT

NSSDC ID- 78-051A-14

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
MAGNETOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
PLANETOLOGY
GEODESY AND CARTOGRAPHY

PERSONNEL

PI - G.	SCHUBERT	U OF CALIF, LA
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BRIEF DESCRIPTION

MEASUREMENTS OF PLASMA TEMPERATURES, MAGNETIC FIELDS, COMPOSITION, AND OTHER DATA WERE USED TO DEVELOP AND TEST THEORIES OF ATMOSPHERIC CIRCULATION AND SOLAR WIND-IONOSPHERE INTERACTIONS. IN THE CASE OF THE TOPOGRAPHY AND GRAVITY, THE DATA (ALTIMETRY AND TRACKING) WERE USED BOTH IN DESCRIPTIVE FASHION, TO SIMPLY CHARACTERIZE THE SURFACE OF VENUS AND ITS GRAVITATIONAL FIELD, AND IN A MORE QUANTITATIVE WAY TO MODEL THE INTERNAL STRUCTURE OF THE PLANET.

----- PIONEER VENUS 1, STEWART-----

INVESTIGATION NAME- PROGRAMMABLE ULTRAVIOLET SPECTROMETER

NSSDC ID- 78-051A-15

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY
IONOSPHERES

PERSONNEL

PI - A.I.	STEWART	U OF COLORADO
O1 - C.A.	BARTH	U OF COLORADO
O1 - C.W.	HORD	U OF COLORADO
O1 - G.E.	THOMAS	U OF COLORADO
O1 - D.	ANDERSON	U OF COLORADO

BRIEF DESCRIPTION

THIS INVESTIGATION USED A 125-MM CASSEGRAIN TELESCOPE ON A 125-MM EBERT-FASTIE SPECTROMETER WITH A PROGRAMMABLE GRATING DRIVE. AIRGLOW, SCATTERED SUNLIGHT, AND HYDROGEN LYMAN ALPHA EMISSIONS WERE TO BE DETECTED IN THE THERMOSPHERE, MESOSPHERE, AND EXOSPHERE OF VENUS. THESE MEASUREMENTS WERE USED TO ESTABLISH AND MAP THE COMPOSITION, TEMPERATURE, AND PHOTOCHEMISTRY OF THE THERMOSPHERE AND IONOSPHERE, TO DETERMINE THE PRESSURE AT AND ABOVE THE VISIBLE CLOUD TOPS, AND TO ESTABLISH THE DISTRIBUTION AND ESCAPE RATE OF ATOMIC HYDROGEN. THE INSTRUMENT OPERATES IN THE 1100-3400 A REGION.

----- PIONEER VENUS 1, TAYLOR-----

INVESTIGATION NAME- RADIOMETRIC TEMPERATURE-SOUNDING
EXPERIMENT

NSSDC ID- 78-051A-16

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY

PERSONNEL

PI - F.	TAYLOR	NASA-JPL
O1 - H.H.	AUMANN	NASA-JPL
O1 - M.T.	CHAHINE	NASA-JPL
O1 - C.B.	FARMER	NASA-JPL
O1 - J.V.	MARTONCHIK	NASA-JPL
O1 - A.P.	INGERSOLL	CALIF INST OF TECH
O1 - J.T.	HOUGHTON	OXFORD U
O1 - G.D.	PESKETT	CLARENDON LAB
O1 - C.D.	RODGERS	OXFORD U
O1 - F.J.	WILLIAMSON	CLARENDON LAB
O1 - R.E.	DICKINSON	NATL CTR FOR ATMOS RES
O1 - J.C.	GILLE	NATL CTR FOR ATMOS RES

BRIEF DESCRIPTION

THIS INVESTIGATION USED AN 8-CHANNEL RADIOMETER FOR VERTICAL TEMPERATURE SOUNDING OF THE ATMOSPHERE FROM THE CLOUD TOPS (60 KM) TO 150 KM AND FOR INVESTIGATIONS OF CLOUD MORPHOLOGY, INCLUDING THE IDENTIFICATION OF POSSIBLE MULTIPLE LAYERS AND WATER VAPOR MAPPING. THE INSTRUMENT WAS BASED ON THE SELECTIVE CHOPPER RADIOMETER AND THE PRESSURE MODULATOR RADIOMETER DESIGNS FLOWN ON NIMBUS SATELLITES.

----- PIONEER VENUS 1, TAYLOR, JR.-----

INVESTIGATION NAME- ION MASS SPECTROMETER

NSSDC ID- 78-051A-17

INVESTIGATIVE PROGRAM CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL

PI - H.A. TAYLOR, JR.	NASA-GSFC
O1 - S.J. BAUER	NASA-GSFC
O1 - R.E. HARTLE	NASA-GSFC
O1 - H.C. BRINTON	NASA-GSFC
O1 - J.R. HERMAN	NASA-GSFC
O1 - T.M. DONAHUE	U OF MICHIGAN
O1 - P.A. CLOUTIER	RICE U
O1 - F.C. MICHEL	RICE U

BRIEF DESCRIPTION

THE COMPOSITION AND CONCENTRATION OF THERMAL POSITIVE IONS IN THE IONOSPHERE OF VENUS WERE DETERMINED AND INTERPRETED IN TERMS OF VERTICAL AND HORIZONTAL COMPONENTS. THE INSTRUMENT USED WAS A BENNETT RADIO-FREQUENCY MASS SPECTROMETER BASED ON THE DESIGN OF THOSE FLOWN ON OGO AND ATMOSPHERIC EXPLORER SATELLITES. A MASS RANGE OF 1 TO 60 U WAS COVERED WITH A VARIETY OF AUTOMATIC SCAN-SEARCH MODES AVAILABLE.

----- PIONEER VENUS 1, WOLFE-----

INVESTIGATION NAME- SOLAR WIND PLASMA DETECTOR

NSSDC ID- 78-051A-18

INVESTIGATIVE PROGRAM CODE SL

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - J.H. WOLFE	NASA-ARC
O1 - A. BARNES	NASA-ARC
O1 - H.R. COLLARD	NASA-ARC
O1 - D.D. MCKIBBIN	NASA-ARC
O1 - J.D. MIHALOV	NASA-ARC
O1 - R.C. WHITTEN	NASA-ARC
O1 - D.S. INTRILIGATOR	U OF SOUTHERN CALIF

BRIEF DESCRIPTION

THE INSTRUMENT FOR THIS EXPERIMENT WAS A QUADRISPHERICAL ELECTROSTATIC ANALYZER (DETECTOR B OF THE PIONEER'S 10-11 PLASMA INSTRUMENT), WITH FIVE CURRENT COLLECTORS AND ELECTROMETERS. THE ENERGY/CHARGE RANGE WAS 50-8000 (IONS) IN 32 STEPS AND 1-500 (ELECTRONS) IN 16 STEPS. THE ANGULAR RANGE COVERED WAS PLUS OR MINUS 85 DEG ELEVATION BY 360 DEG AZIMUTH, AND THE DETECTOR FIELD OF VIEW WAS 15 DEG TIMES 25 DEG OR 15 DEG TIMES 45 DEG, DEPENDING ON POSITION. THE LOGIC DESIGN WAS ESSENTIALLY THAT USED ON PIONEER 8 AND 9. THE OBJECTIVES WERE TO MEASURE SOLAR WIND CONDITIONS OUTSIDE THE VENUSIAN BOW SHOCK, INSIDE THE MAGNETOSHEATH FLOW FIELD, AND TO STUDY THE IONOPAUSE STRUCTURE. SOLAR WIND MEASUREMENTS WERE MADE DURING THE TRANSIT TO VENUS, PARTICULARLY TO STUDY MACROSCALE PROBLEMS AND TO DETERMINE AVERAGE GRADIENTS. THE NEAR-PLANET WAKE REGION WAS ALSO AVAILABLE FOR STUDY.

***** PIONEER VENUS 2*****

SPACECRAFT COMMON NAME- PIONEER VENUS 2
ALTERNATE NAMES- PIONEER VENUS 1978

NSSDC ID- 78-078A

LAUNCH DATE- 08/08/78 WEIGHT- 380. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- VENUS PROBE

PERSONNEL

MG - F.D. KOCHENDORFER	NASA HEADQUARTERS
SC - R.E. MURPHY	NASA HEADQUARTERS
PM - C.F. HALL	NASA-ARC
PS - L. COLIN	NASA-ARC

BRIEF DESCRIPTION

THE SPACECRAFT WAS THE BUS PORTION OF THE PIONEER VENUS MULTIPROBE MISSION. ON THIS MISSION FOUR INSTRUMENTED ATMOSPHERIC ENTRY PROBES WERE CARRIED BY THIS BUS TO THE VICINITY OF VENUS AND RELEASED FOR DESCENT THROUGH THE ATMOSPHERE TO THE PLANETARY SURFACE. TWO SMALL PROBES ENTERED ON THE NIGHTSIDE, AND ONE SMALL PROBE AND ONE LARGE PROBE ENTERED ON THE DAYSIDE OF THE PLANET. THE SPACECRAFT WAS SPIN-STABILIZED. THE TRIP TO VENUS TOOK 123 DAYS. THE FOUR PROBES SEPARATED FROM THE BUS ABOUT 10 TO 20 DAYS BEFORE ENTRY. THE LARGE PROBE TOOK 1-1/2 H TO DESCEND THROUGH THE ATMOSPHERE, WHILE THE THREE SMALLER PROBES REACHED THE SURFACE OF THE PLANET 75 MIN AFTER ENTRY. THE BUS PORTION OF THE SPACECRAFT WAS TARGETED TO ENTER THE VENUSIAN ATMOSPHERE AT A SHALLOW ENTRY ANGLE AND TRANSMIT DATA TO EARTH UNTIL THE BUS WAS DESTROYED BY THE HEAT OF ATMOSPHERIC FRICTION DURING ITS DESCENT. INVESTIGATORS EMPHASIZED THE STUDY OF THE STRUCTURE

AND COMPOSITION OF THE ATMOSPHERE DOWN TO THE SURFACE, THE NATURE AND COMPOSITION OF THE CLOUDS, THE RADIATION FIELD AND ENERGY EXCHANGE IN THE LOWER ATMOSPHERE, AND LOCAL INFORMATION ON THE ATMOSPHERIC CIRCULATION PATTERN. A SISTER MISSION, PIONEER VENUS ORBITER, PLACED AN ORBITING SPACECRAFT AROUND VENUS 2 WEEKS BEFORE THE PROBES WERE RELEASED. SIMULTANEOUS MEASUREMENTS BY THE PROBES AND ORBITER PERMITTED RELATING SPECIFIC LOCAL MEASUREMENTS TO THE GENERAL STATE OF THE PLANET AND ITS ENVIRONMENT AS OBSERVED FROM ORBIT. THE PROBES STOPPED TRANSMITTING TEMPERATURE DATA ABOUT 15 KM ABOVE THE SURFACE OF VENUS, BUT TWO PROBES SURVIVED ON THE SURFACE AND TRANSMITTED OTHER DATA FOR A MATTER OF SECONDS TO MINUTES. THE BUS CEASED TRANSMITTING DATA AT AN ALTITUDE OF ABOUT 165 KM.

----- PIONEER VENUS 2, BAUER-----

INVESTIGATION NAME- PARTICIPATING THEORIST BAUER

NSSDC ID- 78-078A-08

INVESTIGATIVE PROGRAM CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY
INTERPLANETARY PHYSICS
IONOSPHERES

PERSONNEL

PI - S.J. BAUER	NASA-GSFC
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BRIEF DESCRIPTION

A NUMBER OF THEORISTS WERE SELECTED TO PARTICIPATE AS MEMBERS OF THE SCIENCE STEERING GROUP IN DEFINING THE SCIENTIFIC OBJECTIVES, STRATEGY, AND PLANNING FOR THE MISSION, IN COORDINATING THE EXPERIMENTS, AND IN THE ANALYSIS OF FLIGHT EXPERIMENT DATA. EACH THEORIST HAD AN AREA OF MAJOR RESPONSIBILITY THAT INCLUDED ANALYSIS AND INTERPRETATION OF THE IN SITU ION COMPOSITION, ELECTRON DENSITY AND TEMPERATURE, AND NEUTRAL COMPOSITION MEASUREMENTS TO PRODUCE A SELF-CONSISTENT MODEL OF THE DAYSIDE UPPER ATMOSPHERE AND IONOSPHERE OF VENUS, INCLUDING THE ROLE OF CHEMICAL AND TRANSPORT PROCESSES, AS WELL AS AN UNDERSTANDING OF THE TYPE OF INTERACTION BETWEEN THE SOLAR WIND AND THE VENUS IONOSPHERE.

----- PIONEER VENUS 2, COUNSELMAN-----

INVESTIGATION NAME- DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRIC TRACKING

NSSDC ID- 78-078A-06

INVESTIGATIVE PROGRAM CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
METEOROLOGY
PLANETOLOGY

PERSONNEL

PI - C.C. COUNSELMAN	MASS INST OF TECH
O1 - I.I. SHAPIRO	MASS INST OF TECH
O1 - R.G. PRINN	MASS INST OF TECH
O1 - J. CHARNEY	MASS INST OF TECH
O1 - G. PETTENGILL	MASS INST OF TECH

BRIEF DESCRIPTION

THIS EXPERIMENT INVOLVED APPLYING DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRY TECHNIQUES TO THE RADIO SIGNALS FROM THE ENTRY PROBE AND BUS IN ORDER TO INFER OR PLACE UPPER LIMITS ON WIND SPEEDS IN THE LOWER ATMOSPHERE. THESE RESULTS WERE USED IN MODELING THE CIRCULATION PATTERNS OF VENUS' ATMOSPHERE. DATA TAKEN PRIOR TO PROBE ENTRY WERE USED, WHERE FEASIBLE, TO INFER CHARACTERISTICS OF VENUS' GRAVITY FIELD FOR USE WITH PROBE ENTRY OPERATIONS AS WELL AS IN LAYER SCIENTIFIC EVALUATION.

----- PIONEER VENUS 2, DONAHUE-----

INVESTIGATION NAME- PARTICIPATING THEORIST DONAHUE

NSSDC ID- 78-078A-09

INVESTIGATIVE PROGRAM CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY

PERSONNEL

PI - T.M. DONAHUE	U OF MICHIGAN
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BRIEF DESCRIPTION

A NUMBER OF THEORISTS WERE SELECTED TO PARTICIPATE AS MEMBERS OF THE SCIENCE STEERING GROUP IN DEFINING THE SCIENTIFIC OBJECTIVES, STRATEGY, AND PLANNING FOR THE MISSION, IN COORDINATING THE EXPERIMENTS, AND IN THE ANALYSIS OF FLIGHT EXPERIMENT DATA. EACH THEORIST HAD AN AREA OF MAJOR RESPONSIBILITY THAT INCLUDED THE INTERDISCIPLINARY ASPECTS OF ATMOSPHERIC CHEMISTRY AND RADIATIVE TRANSPORT THEORY TO ARRIVE AT AN UNDERSTANDING OF THE AERONOMY OF THE ATMOSPHERE OF VENUS.

----- PIONEER VENUS 2, GOODY-----

INVESTIGATION NAME- PARTICIPATING THEORIST GOODY

NSSDC ID- 78-078A-10 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY
METEOROLOGY

PERSONNEL

PI - R.M. GOODY

HARVARD U

BRIEF DESCRIPTION

A NUMBER OF THEORISTS WERE SELECTED TO PARTICIPATE AS MEMBERS OF THE SCIENCE STEERING GROUP IN DEFINING THE SCIENTIFIC OBJECTIVES, STRATEGY, AND PLANNING FOR THE MISSION, IN COORDINATING THE EXPERIMENTS, AND IN THE ANALYSIS OF FLIGHT EXPERIMENT DATA. EACH THEORIST HAD AN AREA OF MAJOR RESPONSIBILITY THAT INCLUDED THE THEORY OF THE CIRCULATION OF THE LOWER ATMOSPHERE AND THE RECOMBINATION OF THE PRODUCTS OF PHOTOLYSIS.

----- PIONEER VENUS 2, HUNTEN-----

INVESTIGATION NAME- PARTICIPATING THEORIST HUNTEN

NSSDC ID- 78-078A-11 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY
METEOROLOGY

PERSONNEL

PI - D.M. HUNTEN

U OF ARIZONA

BRIEF DESCRIPTION

A NUMBER OF THEORISTS WERE SELECTED TO PARTICIPATE AS MEMBERS OF THE SCIENCE STEERING GROUP IN DEFINING THE SCIENTIFIC OBJECTIVES, STRATEGY, AND PLANNING FOR THE MISSION, IN COORDINATING THE EXPERIMENTS, AND IN THE ANALYSIS OF FLIGHT EXPERIMENT DATA. EACH THEORIST HAD AN AREA OF MAJOR RESPONSIBILITY THAT INCLUDED A DETAILED DESCRIPTION OF THE CLOUDS AND THE HEAT BALANCE OF THE ATMOSPHERE AND SURFACE OF VENUS AND A DETERMINATION OF THE DYNAMICS AND AERONOMY OF THE UPPER ATMOSPHERE.

----- PIONEER VENUS 2, PETTENGILL-----

INVESTIGATION NAME- RADIO SCIENCE TEAM

NSSDC ID- 78-078A-07 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY
METEOROLOGY
PLANETARY IONOSPHERES

PERSONNEL

TL - G. PETTENGILL
TM - T.A. CROFT
TM - A.J. KLIORE
TM - R. WOO

MASS INST OF TECH
SRI INTERNATIONAL
NASA-JPL
NASA-JPL

BRIEF DESCRIPTION

THE RADIO SCIENCE TEAM HAD THE RESPONSIBILITY FOR PLANNING, COORDINATING, AND RECOMMENDING SCIENTIFIC USES OF RADIO SIGNALS FOR THE MISSION, AND OF EXECUTING APPROVED EXPERIMENTS AND CONDUCTING THE DATA ANALYSIS REQUIRED. THE MAJOR AREAS OF RESPONSIBILITY WERE IN THE USE OF S-BAND TELEMETRY SIGNALS TO OBTAIN PRECISE TRAJECTORY AND DESCENT DATA OF THE ENTRY PROBES FOR DETERMINATION OF ATMOSPHERIC MOTIONS, WINDS, AND TURBULENCE. ALSO, THE TEAM WAS RESPONSIBLE FOR THE DEVELOPMENT AND ANALYSIS OF RECOMMENDATIONS PERTAINING TO THE APPLICATIONS OF VERY LONG BASELINE INTERFEROMETRY TECHNIQUES TO THE MISSION.

----- PIONEER VENUS 2, POLLACK-----

INVESTIGATION NAME- PARTICIPATING THEORIST POLLACK

NSSDC ID- 78-078A-12 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY
GEODESY AND CARTOGRAPHY

PERSONNEL

PI - J.B. POLLACK

NASA-ARC

BRIEF DESCRIPTION

A NUMBER OF THEORISTS WERE SELECTED TO PARTICIPATE AS MEMBERS OF THE SCIENCE STEERING GROUP IN DEFINING THE SCIENTIFIC OBJECTIVES, STRATEGY, AND PLANNING FOR THE MISSION, IN COORDINATING THE EXPERIMENTS, AND IN THE ANALYSIS OF FLIGHT EXPERIMENT DATA. EACH THEORIST HAD AN AREA OF MAJOR RESPONSIBILITY THAT INCLUDED THE DETERMINATION OF IMPORTANT SOURCES OF THERMAL OPACITY, THE SCATTERING CHARACTERISTICS OF THE CLOUDS, AND SOLAR ENERGY DEPOSITION PROFILE, AND THE THEORY AND EVOLUTION OF THE ATMOSPHERE AND LITHOSPHERE OF VENUS.

----- PIONEER VENUS 2, SPENCER-----

INVESTIGATION NAME- PARTICIPATING THEORIST SPENCER

NSSDC ID- 78-078A-13 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY

PERSONNEL

PI - N.W. SPENCER

NASA-GSFC

BRIEF DESCRIPTION

A NUMBER OF THEORISTS WERE SELECTED TO PARTICIPATE AS MEMBERS OF THE SCIENCE STEERING GROUP IN DEFINING THE SCIENTIFIC OBJECTIVES, STRATEGY, AND PLANNING FOR THE MISSION, IN COORDINATING THE EXPERIMENTS, AND IN THE ANALYSIS OF FLIGHT EXPERIMENT DATA. EACH THEORIST HAD AN AREA OF MAJOR RESPONSIBILITY THAT INCLUDED THE INTERDISCIPLINARY ASPECTS OF THE NATURE OF THE COMPOSITION OF THE ATMOSPHERE OF VENUS, THE NATURE AND COMPOSITION OF THE CLOUDS IN THE ATMOSPHERE, AND THE DRIVING FORCES OR ENERGY INPUTS AFFECTING THE BEHAVIOR OF THE ATMOSPHERE AND CLOUDS AND CHANGES THAT TAKE PLACE.

----- PIONEER VENUS 2, TAYLOR, JR.-----

INVESTIGATION NAME- ION-MASS SPECTROMETER

NSSDC ID- 78-078A-02 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
PLANETARY IONOSPHERES
AERONOMY

PERSONNEL

PI - H.A. TAYLOR, JR.
OI - S.J. BAUER
OI - T.M. DONAHUE
OI - P.A. CLOUTIER
OI - R.E. HARTLE
OI - H.C. BRINTON
OI - F.C. MICHEL

NASA-GSFC
NASA-GSFC
U OF MICHIGAN
RICE U
NASA-GSFC
NASA-GSFC
RICE U

BRIEF DESCRIPTION

THIS ION MASS SPECTROMETER EXPERIMENT OBTAINED MEASUREMENTS WHICH PROVIDED INFORMATION ON THE SOLAR WIND INTERACTION WITH VENUS, UPPER ATMOSPHERE PHOTOCHEMISTRY, AND THE MASS AND HEAT TRANSPORT CHARACTERISTICS OF THE ATMOSPHERE. A BENNETT ION SPECTROMETER, SIMILAR TO UNITS FLOWN ON MANY EARTH SATELLITES AND ROCKETS, MEASURED VENUS' UPPER ATMOSPHERE ION CONCENTRATIONS IN THE MASS RANGE FROM 1 TO 60 ATOMIC MASS UNITS (U) FROM THE TIME OF CROSSING VENUS' BOWSHOCK TO BUS BURNUP.

----- PIONEER VENUS 2, VON ZAHN-----

INVESTIGATION NAME- NEUTRAL PARTICLE MASS SPECTROMETER

NSSDC ID- 78-078A-03 INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY

PERSONNEL

PI - U. VON ZAHN
OI - A.O.C. NIER
OI - D.M. HUNTEN

U OF BONN
U OF MINNESOTA
U OF ARIZONA

BRIEF DESCRIPTION

THIS NEUTRAL PARTICLE MASS SPECTROMETER EXPERIMENT OBTAINED MEASUREMENTS WHICH PROVIDED INFORMATION ON THE ORIGIN AND EVOLUTION OF VENUS' ATMOSPHERE, THE PRESENT ENERGY BALANCE AND DYNAMICS OF THE UPPER ATMOSPHERE, AND THE INTERACTION OF THE UPPER ATMOSPHERE WITH SOLAR RADIATION AND THE INTERPLANETARY MEDIUM. A MAGNETIC DEFLECTION, DOUBLE-FOCUSING MASS SPECTROMETER WAS FLOWN TO MEASURE THE UPPER ATMOSPHERE NEUTRAL MOLECULES IN THE MASS RANGE 1 TO 46 ATOMIC MASS UNITS.

***** PIONEER VENUS PROBE LRG*****

SPACECRAFT COMMON NAME- PIONEER VENUS PROBE LRG
ALTERNATE NAMES- PIONEER VENUS 1978

NSSDC ID- 78-078D

LAUNCH DATE- 08/08/78
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

WEIGHT- 300. KG

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- VENUS PROBE

PERSONNEL
MG - F.D. KOCHENDORFER NASA HEADQUARTERS
SC - M.A. MITZ NASA HEADQUARTERS
PM - C.F. HALL NASA-ARC
PS - L. COLIN NASA-ARC

BRIEF DESCRIPTION

THIS SPACECRAFT WAS THE LARGE PROBE PORTION OF THE PIONEER-VENUS MULTIPROBE MISSION. ON THIS MISSION FOUR INSTRUMENTED ATMOSPHERIC ENTRY PROBES WERE CARRIED BY A SPACECRAFT BUS TO THE VICINITY OF VENUS AND RELEASED FOR DESCENT THROUGH THE ATMOSPHERE TO THE PLANETARY SURFACE. TWO SMALL PROBES ENTERED ON THE NIGHTSIDE AND A SMALL PROBE AND THIS LARGE PROBE ENTERED ON THE DAYSIDE OF THE PLANET. THE SPACECRAFT BUS ENTERED THE ATMOSPHERE AND OBTAINED ATMOSPHERIC COMPOSITION DATA UNTIL BURNUP. INVESTIGATIONS EMPHASIZED THE STUDY OF THE STRUCTURE AND COMPOSITION OF THE ATMOSPHERE DOWN TO THE SURFACE, THE NATURE AND COMPOSITION OF THE CLOUDS, THE RADIATION FIELD AND ENERGY EXCHANGE IN THE LOWER ATMOSPHERE, AND LOCAL INFORMATION ON THE ATMOSPHERIC CIRCULATION PATTERN. A SISTER MISSION, PIONEER VENUS ORBITER, PLACED AN ORBITING SPACECRAFT AROUND VENUS 2 WEEKS BEFORE THE PROBES WERE RELEASED. SIMULTANEOUS MEASUREMENTS BY THE PROBES AND ORBITER PERMITTED RELATING SPECIFIC LOCAL MEASUREMENTS TO THE GENERAL STATE OF THE PLANET AND ITS ENVIRONMENT AS OBSERVED FROM ORBIT.

----- PIONEER VENUS PROBE LRG, BOESE-----

INVESTIGATION NAME- INFRARED RADIOMETER

NSSDC ID- 78-078D-05 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY

PERSONNEL
PI - R.W. BOESE NASA-ARC
OI - J.B. POLLACK NASA-ARC
OI - J.H. MILLER NASA-ARC
OI - L.P. GIVER NASA-ARC

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS EXPERIMENT WERE TO MEASURE THE ATMOSPHERE THERMAL FLUX PROFILE, DETECT CLOUD LAYERS AND INFER THEIR COMPOSITION, AND ESTIMATE THE ATMOSPHERIC WATER VAPOR CONTENT. THIS EXPERIMENT USED A 4-CHANNEL INFRARED RADIOMETER LOOKING DOWN FROM THE PROBE. TWO INTERNAL BLACKBODIES WERE USED TO ALLOW ABSOLUTE MEASUREMENTS OF THE FLUX IN EACH CHANNEL. THE INSTRUMENT WEIGHED ABOUT 2 KG AND USED ABOUT 3 W OF POWER.

----- PIONEER VENUS PROBE LRG, COUNSELMAN-----

INVESTIGATION NAME- DIFFERENTIAL VERY LONG-BASELINE
INTERFEROMETRIC TRACKING

NSSDC ID- 78-078D-09 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
METEOROLOGY
AERONOMY

PERSONNEL
PI - C.C. COUNSELMAN MASS INST OF TECH
OI - G. PETTENGILL MASS INST OF TECH
OI - I.I. SHAPIRO MASS INST OF TECH
OI - R.G. PRINN MASS INST OF TECH
OI - J. CHARNEY MASS INST OF TECH

BRIEF DESCRIPTION

THIS EXPERIMENT INVOLVED APPLYING DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRY TECHNIQUES TO THE RADIO SIGNALS FROM THE ENTRY PROBE AND BUS IN ORDER TO INFER OR PLACE UPPER LIMITS ON WIND SPEEDS IN THE LOWER ATMOSPHERE. THESE RESULTS WERE USED IN MODELING THE CIRCULATION PATTERNS OF VENUS' ATMOSPHERE. DATA TAKEN PRIOR TO PROBE ENTRY WERE USED, WHERE FEASIBLE, TO INFER CHARACTERISTICS OF VENUS' GRAVITY FIELD FOR USE WITH PROBE ENTRY OPERATIONS AS WELL AS IN LATER SCIENTIFIC EVALUATION.

----- PIONEER VENUS PROBE LRG, HOFFMAN-----

INVESTIGATION NAME- NEUTRAL PARTICLE MASS SPECTROMETER

NSSDC ID- 78-078D-06

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY

PERSONNEL
PI - J.H. HOFFMAN U OF TEXAS, DALLAS
OI - R.R. HODGES, JR. U OF TEXAS, DALLAS
OI - M. KOLPIN TRW SYSTEMS GROUP
OI - M.B. MCELROY HARVARD U
OI - T.M. DONAHUE U OF MICHIGAN

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION WAS TO MEASURE THE COMPOSITION OF THE LOWER ATMOSPHERE OF VENUS. THIS INVESTIGATION USED A CERAMIC MICRO-LEAK GAS INLET AND A DOUBLE-FOCUSING MAGNETIC DEFLECTION MASS SPECTROMETER. ABOUT 50 ANALYSES OF THE VENUSIAN ATMOSPHERE WERE PLANNED DURING THE PROBE DESCENT. A SEPARATE SAMPLE OF THE ATMOSPHERE WAS ANALYZED FOR RARE GASSES. THE ANALYZER HAD A MASS RANGE OF 1 TO 212 U AND A DYNAMIC RANGE OF 1.E+7. THE INSTRUMENT WAS BASED ON A DESIGN FLOWN PREVIOUSLY.

----- PIONEER VENUS PROBE LRG, KNOLLENBERG-----

INVESTIGATION NAME- CLOUD PARTICLE SIZE SPECTROMETER

NSSDC ID- 78-078D-03 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY

PERSONNEL
PI - R. KNOLLENBERG U OF CHICAGO
OI - D.M. HUNTEN U OF ARIZONA

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT WAS TO MEASURE VENUS' CLOUD PARTICLE SIZES AND CONCENTRATIONS. A LASER WAS USED TO ILLUMINATE CLOUD PARTICLES. OPTICAL LENSES IMAGED THE PARTICLE SHADOWS ON ARRAYS OF DETECTORS. THE PARTICLE SHADOWS WERE USED TO DETERMINE PARTICLE SIZE AND CONCENTRATION. THE FLIGHT SENSOR WAS SIMILAR TO THOSE FLOWN IN AIRCRAFT AND BALLOONS.

----- PIONEER VENUS PROBE LRG, OYAMA-----

INVESTIGATION NAME- GAS CHROMATOGRAPH

NSSDC ID- 78-078D-04 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY

PERSONNEL
PI - V.I. OYAMA NASA-ARC
OI - J.B. POLLACK NASA-ARC
OI - G. CARLE NASA-ARC
OI - F. WOELLER NASA-ARC

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT WAS TO DETERMINE THE COMPOSITION OF VENUS' LOWER ATMOSPHERE. FROM THESE MEASUREMENTS, DEDUCTIONS WERE MADE OF THE GASEOUS SOURCES OF INFRARED OPACITY, THE DEGREE OF DIFFERENTIATION OF VENUS' INTERIOR, THE DEGREE OF SIMILARITY BETWEEN THE SOLID BODIES OF EARTH AND VENUS, AND EVOLUTION OF VENUS' ATMOSPHERE. TWO GAS CHROMATOGRAPH COLUMNS WERE USED TO ANALYZE SAMPLES OF THE ATMOSPHERE DURING PROBE DESCENT.

----- PIONEER VENUS PROBE LRG, RAGENT-----

INVESTIGATION NAME- CLOUD EXTENT, STRUCTURE, AND
DISTRIBUTION

NSSDC ID- 78-078D-02 INVESTIGATIVE PROGRAM
CODE SL/CO-OP
INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY
METEOROLOGY

PERSONNEL
PI - B. RAGENT NASA-ARC
PI - J.E. BLAMONT CNRS-SA

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A NEPHELOMETER TO MEASURE THE ENERGY BACKSCATTERED FROM CLOUD PARTICLES. IT USED A PULSED GALLIUM ARSENIDE LASER DIODE TO ILLUMINATE THE CLOUDS. THE ALTITUDE HISTORY OF THE BACKSCATTERED SIGNAL INDICATED THE PRESENCE AND VERTICAL EXTENT OF CLOUDS ALONG THE TRAJECTORY. COMPARISONS WITH THE MEASUREMENTS FROM THE SMALL PROBES INDICATED THE SPATIAL VARIABILITY OF THE CLOUD STRUCTURE. THE LASER OPERATED AT ABOUT 9000 A. THE EXPERIMENT WEIGHED ABOUT 0.5 KG AND USED ABOUT 1.3 W OF POWER.

----- PIONEER VENUS PROBE LRG, SEIFF-----

INVESTIGATION NAME- ATMOSPHERE STRUCTURE

NSSDC ID- 78-078D-01

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
METEOROLOGY
AERONOMY

PERSONNEL

PI - A. SEIFF	NASA-ARC
O1 - S.C. SOMMER	NASA-ARC
O1 - R.C. BLANCHARD	NASA-LARC
O1 - D.B. KIRK	NASA-ARC
O1 - R.E. YOUNG	NASA-ARC
O1 - J. DERR	US GEOLOGICAL SURVEY

BRIEF DESCRIPTION

THE INSTRUMENTS FOR THIS EXPERIMENT INCLUDED A THREE-AXIS ACCELEROMETER, PRESSURE SENSORS, AND TEMPERATURE SENSORS. THEY WERE BASED ON THE TECHNOLOGY DEMONSTRATED BY THE PAET ROCKET VEHICLE (PLANETARY ATMOSPHERE EXPERIMENT TEST R7106-2001). THE MEASUREMENTS WERE USED TO CONSTRUCT A PROFILE OF ATMOSPHERE STATE PROPERTIES FOR THE LARGE PROBE TRAJECTORY FROM THE SURFACE TO APPROXIMATELY 140 KM ALTITUDE. THEY WERE ALSO USED TO DETERMINE VERTICAL WIND VELOCITY, HORIZONTAL WIND VELOCITY, AND TURBULENCE. BY COMPARING ATMOSPHERE CONDITIONS ALONG THE LARGE PROBE TRAJECTORY WITH THOSE MEASURED BY THE SMALL PROBES, CIRCULATION MODELS OF THE ATMOSPHERE WERE DETERMINED. THE INSTRUMENTS WEIGHED ABOUT 2.5 KG AND CONSUMED ABOUT 4.7 W OF POWER.

----- PIONEER VENUS PROBE LRG, TOMASKO-----

INVESTIGATION NAME- SOLAR ENERGY PENETRATION INTO THE ATMOSPHERE

NSSDC ID- 78-078D-07

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY

PERSONNEL

PI - M.G. TOMASKO	U OF ARIZONA
O1 - W. WOLFE	U OF ARIZONA
O1 - A. CLEMENTS	U OF ARIZONA

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION WAS TO DETERMINE THE REGIONS IN VENUS' ATMOSPHERE WHERE SOLAR ENERGY IS DEPOSITED. SIX NARROW-FIELD-OF-VIEW DETECTORS WERE USED TO MEASURE THE INTENSITY OF SCATTERED SOLAR LIGHT. AS THE PROBE DESCENDED THROUGH THE ATMOSPHERE, THE DIFFERENCE BETWEEN UPWARD-LOOKING AND DOWNWARD-LOOKING DETECTORS INDICATED THE NET DOWNWARD FLUX.

***** PIONEER VENUS PROBE SM1*****

SPACECRAFT COMMON NAME- PIONEER VENUS PROBE SM1
ALTERNATE NAMES- PIONEER VENUS 1978

NSSDC ID- 78-078E

LAUNCH DATE- 08/08/78 WEIGHT- 75. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- VENUS PROBE

PERSONNEL

MG - F.D. KOCHENDORFER	NASA HEADQUARTERS
SC - M.A. MITZ	NASA HEADQUARTERS
PM - C.F. HALL	NASA-ARC
PS - L. COLIN	NASA-ARC

BRIEF DESCRIPTION

THIS SPACECRAFT WAS THE FIRST SMALL PROBE OF THE PIONEER-VENUS MULTIPROBE MISSION. ON THIS MISSION FOUR INSTRUMENTED ATMOSPHERIC ENTRY PROBES WERE CARRIED BY A SPACECRAFT BUS TO THE VICINITY OF VENUS FOR DESCENT THROUGH THE ATMOSPHERE TO THE PLANETARY SURFACE. TWO SMALL PROBES ENTERED ON THE NIGHTSIDE, AND ONE SMALL PROBE AND ONE LARGE PROBE ENTERED ON THE DAYSIDE OF THE PLANET. THE SPACECRAFT BUS ENTERED THE ATMOSPHERE AND OBTAINED ATMOSPHERIC COMPOSITION DATA UNTIL BURNUP. INVESTIGATIONS EMPHASIZED THE STUDY OF THE STRUCTURE COMPOSITION AND NATURE OF THE ATMOSPHERE DOWN TO THE SURFACE, AND OF THE CLOUDS, THE RADIATION FIELD AND ENERGY EXCHANGE IN THE LOWER ATMOSPHERE, AND LOCAL INFORMATION ON THE ATMOSPHERIC CIRCULATION PATTERN. A SISTER MISSION, PIONEER VENUS ORBITER, PLACED AN ORBITING SPACECRAFT AROUND VENUS 2 WEEKS BEFORE THE PROBES WERE RELEASED. SIMULTANEOUS MEASUREMENTS BY THE PROBES AND ORBITER PERMITTED RELATING SPECIFIC LOCAL MEASUREMENTS TO THE GENERAL STATE OF THE PLANET AND ITS ENVIRONMENT AS OBSERVED FROM ORBIT.

----- PIONEER VENUS PROBE SM1, COUNSELMAN-----

INVESTIGATION NAME- DIFFERENTIAL VERY LONG BASELINE INTERFEROMETRIC TRACKING

NSSDC ID- 78-078E-03

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
METEOROLOGY
AERONOMY

PERSONNEL

PI - C.C. COUNSELMAN	MASS INST OF TECH
O1 - I.I. SHAPIRO	MASS INST OF TECH
O1 - R.G. PRINN	MASS INST OF TECH
O1 - J. CHARNEY	MASS INST OF TECH
O1 - G. PETTENGILL	MASS INST OF TECH

BRIEF DESCRIPTION

THIS EXPERIMENT INVOLVED APPLYING DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRY TECHNIQUES TO THE RADIO SIGNALS FROM THE ENTRY PROBE AND BUS IN ORDER TO INFER OR PLACE UPPER LIMITS ON WIND SPEEDS IN THE LOWER ATMOSPHERE. THESE RESULTS WERE USED IN MODELING THE CIRCULATION PATTERNS OF VENUS' ATMOSPHERE. DATA TAKEN PRIOR TO PROBE ENTRY WERE USED, WHERE FEASIBLE, TO INFER CHARACTERISTICS OF VENUS' GRAVITY FIELD FOR USE WITH PROBE ENTRY OPERATIONS AS WELL AS IN LATER SCIENTIFIC EVALUATION.

----- PIONEER VENUS PROBE SM1, RAGENT-----

INVESTIGATION NAME- CLOUD EXTENT, STRUCTURE, AND DISTRIBUTION

NSSDC ID- 78-078E-02

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY
METEOROLOGY

PERSONNEL

PI - B. RAGENT	NASA-ARC
PI - J.E. BLAMONT	CNRS-SA

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A NEPHELOMETER TO MEASURE THE ENERGY BACKSCATTERED FROM CLOUD PARTICLES. IT USED A PULSED GALLIUM ARSENIDE LASER DIODE TO ILLUMINATE THE CLOUDS. THE ALTITUDE HISTORY OF THE BACKSCATTERED SIGNAL INDICATED THE PRESENCE AND VERTICAL EXTENT OF CLOUDS ALONG THE TRAJECTORY. COMPARISONS WITH THE MEASUREMENTS FROM THE OTHER PROBES INDICATED THE SPATIAL VARIABILITY OF THE CLOUD STRUCTURE. THE LASER OPERATED AT ABOUT 9000 A. THE EXPERIMENT WEIGHED ABOUT 0.6 KG AND USED ABOUT 1.3 W OF POWER.

----- PIONEER VENUS PROBE SM1, SEIFF-----

INVESTIGATION NAME- ATMOSPHERE STRUCTURE

NSSDC ID- 78-078E-01

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
METEOROLOGY
AERONOMY

PERSONNEL

PI - A. SEIFF	NASA-ARC
O1 - S.C. SOMMER	NASA-ARC
O1 - D.B. KIRK	NASA-ARC
O1 - R.C. BLANCHARD	NASA-LARC
O1 - R.E. YOUNG	NASA-ARC
O1 - J. DERR	US GEOLOGICAL SURVEY

BRIEF DESCRIPTION

THE INSTRUMENTS FOR THIS EXPERIMENT INCLUDED A SINGLE-AXIS ACCELEROMETER, PRESSURE SENSORS, AND TEMPERATURE SENSORS. THEY WERE BASED ON THE TECHNOLOGY DEMONSTRATED BY THE PAET ROCKET VEHICLE (PLANETARY ATMOSPHERE EXPERIMENT TEST R7106-2001). THE MEASUREMENTS WERE USED TO CONSTRUCT A PROFILE OF ATMOSPHERE STATE PROPERTIES FOR THE TRAJECTORY FROM THE SURFACE TO APPROXIMATELY 140 KM ALTITUDE. THEY WERE ALSO USED TO DETERMINE VERTICAL WIND VELOCITY, HORIZONTAL WIND VELOCITY, AND TURBULENCE. BY COMPARING ATMOSPHERE CONDITIONS ALONG THIS TRAJECTORY WITH THOSE MEASURED BY THE OTHER PROBES, CIRCULATION MODELS OF THE ATMOSPHERE WERE DETERMINED. THE INSTRUMENTS WEIGHED ABOUT 1.2 KG AND CONSUMED ABOUT 4.8 W OF POWER.

----- PIONEER VENUS PROBE SM1, SUOMI-----

INVESTIGATION NAME- INFRARED RADIOMETER

NSSDC ID- 78-078E-04

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY

PERSONNEL

PI - V.E. SUOMI
OI - J. LENOBLE
OI - L.A. SROMOVSKY
OI - A. FYMAT
OI - G.E. DANIELSON
OI - M. HERMAN

U OF WISCONSIN
U OF LILLE
U OF WISCONSIN
NASA-JPL
NASA-JPL
U OF LILLE

BRIEF DESCRIPTION

THE OBJECTIVES WERE TO LOCATE REGIONS OF RADIATIVE CONVERGENCE AND DIVERGENCE AS A FUNCTION OF ALTITUDE AND TO INDICATE THE HEIGHT AT WHICH SOLAR ENERGY IS ABSORBED BY THE ATMOSPHERE. THIS EXPERIMENT USED A SMALL NET FLUX RADIOMETER ON THE PROBE TARGETED TO THE DAYSIDE OF VENUS TO MEASURE THE NET SOLAR FLUX IN THE 0.2- TO 4-MICROMETER REGION. THE TWO PROBES TARGETED TO THE NIGHTSIDE OF THE PLANET CARRIED NET INFRARED FLUX SENSORS COVERING THE 1- TO 25-MICROMETER REGION. THE INSTRUMENT WEIGHED ABOUT 0.4 KG AND USED 2.2 W OF POWER.

***** PIONEER VENUS PROBE SM2*****

SPACECRAFT COMMON NAME- PIONEER VENUS PROBE SM2
ALTERNATE NAMES- PIONEER VENUS 1978

NSSDC ID- 78-078F

LAUNCH DATE- 08/08/78 WEIGHT- 75. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- VENUS PROBE

PERSONNEL

MG - F.D. KOCHENDORFER
SC - M.A. MITZ
PM - C.F. HALL
PS - L. COLIN

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-ARC
NASA-ARC

BRIEF DESCRIPTION

THIS SPACECRAFT WAS THE SECOND SMALL PROBE OF THE PIONEER-VENUS MULTIPROBE MISSION. ON THIS MISSION FOUR INSTRUMENTED ATMOSPHERIC ENTRY PROBES WERE CARRIED BY A SPACECRAFT BUS TO THE VICINITY OF VENUS FOR DESCENT THROUGH THE ATMOSPHERE TO THE PLANETARY SURFACE. TWO SMALL PROBES ENTERED ON THE NIGHTSIDE, AND ONE SMALL PROBE AND ONE LARGE PROBE ENTERED ON THE DAYSIDE OF THE PLANET. THE SPACECRAFT BUS ENTERED THE ATMOSPHERE AND OBTAINED ATMOSPHERIC COMPOSITION DATA UNTIL BURNUP. INVESTIGATIONS EMPHASIZED THE STUDY OF THE STRUCTURE COMPOSITION AND NATURE OF THE ATMOSPHERE DOWN TO THE SURFACE, AND OF THE CLOUDS, THE RADIATION FIELD AND ENERGY EXCHANGE IN THE LOWER ATMOSPHERE, AND LOCAL INFORMATION ON THE ATMOSPHERIC CIRCULATION PATTERN. A SISTER MISSION, PIONEER VENUS ORBITER, PLACED AN ORBITING SPACECRAFT AROUND VENUS 2 WEEKS BEFORE THE PROBES WERE RELEASED. SIMULTANEOUS MEASUREMENTS BY THE PROBES AND ORBITER PERMITTED RELATING SPECIFIC LOCAL MEASUREMENTS TO THE GENERAL STATE OF THE PLANET AND ITS ENVIRONMENT AS OBSERVED FROM ORBIT.

----- PIONEER VENUS PROBE SM2, COUNSELMAN-----

INVESTIGATION NAME- DIFFERENTIAL VERY-LONG-BASELINE
INTERFEROMETRIC TRACKING

NSSDC ID- 78-078F-03

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
METEOROLOGY
AERONOMY

PERSONNEL

PI - C.C. COUNSELMAN
OI - I.I. SHAPIRO
OI - R.G. PRINN
OI - J. CHARNEY
OI - G. PETTENGILL

MASS INST OF TECH
MASS INST OF TECH
MASS INST OF TECH
MASS INST OF TECH
MASS INST OF TECH

BRIEF DESCRIPTION

THIS EXPERIMENT INVOLVED APPLYING DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRY TECHNIQUES TO THE RADIO SIGNALS FROM THE ENTRY PROBE AND BUS IN ORDER TO INFER OR PLACE UPPER LIMITS ON WIND SPEEDS IN THE LOWER ATMOSPHERE. THESE RESULTS WERE USED IN MODELING THE CIRCULATION PATTERNS OF VENUS' ATMOSPHERE. DATA TAKEN PRIOR TO PROBE ENTRY WERE USED, WHERE FEASIBLE, TO INFER CHARACTERISTICS OF VENUS' GRAVITY FIELD FOR USE WITH PROBE ENTRY OPERATIONS AS WELL AS IN LATER SCIENTIFIC EVALUATION.

----- PIONEER VENUS PROBE SM2, RAGENT-----

INVESTIGATION NAME- CLOUD EXTENT, STRUCTURE, AND
DISTRIBUTION

NSSDC ID- 78-078F-02

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY
METEOROLOGY

PERSONNEL

PI - B. RAGENT
PI - J.E. BLAMONT

NASA-ARC
CNRS-SA

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A NEPHELOMETER TO MEASURE THE ENERGY BACKSCATTERED FROM CLOUD PARTICLES. IT USED A PULSED GALLIUM ARSENIDE LASER DIODE TO ILLUMINATE THE CLOUDS. THE ALTITUDE HISTORY OF THE BACKSCATTERED SIGNAL INDICATED THE PRESENCE AND VERTICAL EXTENT OF CLOUDS ALONG THE TRAJECTORY. COMPARISONS WITH THE MEASUREMENTS FROM THE OTHER PROBES INDICATED THE SPATIAL VARIABILITY OF THE CLOUD STRUCTURE. THE LASER OPERATED AT ABOUT 9000 A. THE EXPERIMENT WEIGHED ABOUT 0.6 KG AND USED ABOUT 1.2 W OF POWER.

----- PIONEER VENUS PROBE SM2, SEIFF-----

INVESTIGATION NAME- ATMOSPHERE STRUCTURE

NSSDC ID- 78-078F-01

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
METEOROLOGY
AERONOMY

PERSONNEL

PI - A. SEIFF
OI - S.C. SOMMER
OI - D.B. KIRK
OI - R.C. BLANCHARD
OI - R.E. YOUNG
OI - J. DERR

NASA-ARC
NASA-ARC
NASA-ARC
NASA-LARC
NASA-ARC
US GEOLOGICAL SURVEY

BRIEF DESCRIPTION

THE INSTRUMENTS FOR THIS EXPERIMENT INCLUDED A THREE-AXIS ACCELEROMETER, PRESSURE SENSORS, AND TEMPERATURE SENSORS. THEY WERE BASED ON THE TECHNOLOGY DEMONSTRATED BY THE PAET ROCKET VEHICLE (PLANETARY ATMOSPHERE EXPERIMENT TEST R7106-2001). THE MEASUREMENTS WERE USED TO CONSTRUCT A PROFILE OF ATMOSPHERE STATE PROPERTIES FOR THE TRAJECTORY FROM THE SURFACE TO APPROXIMATELY 140 KM ALTITUDE. THEY WERE ALSO USED TO DETERMINE VERTICAL WIND VELOCITY, HORIZONTAL WIND VELOCITY, AND TURBULENCE. BY COMPARING ATMOSPHERE CONDITIONS ALONG THIS TRAJECTORY WITH THOSE MEASURED BY OTHER SMALL PROBES, CIRCULATION MODELS OF THE ATMOSPHERE ARE DETERMINED. THE INSTRUMENTS WEIGHED ABOUT 1.2 KG AND CONSUMED ABOUT 3.4 W OF POWER.

----- PIONEER VENUS PROBE SM2, SUOMI-----

INVESTIGATION NAME- INFRARED RADIOMETER

NSSDC ID- 78-078F-04

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY

PERSONNEL

PI - V.E. SUOMI
OI - J. LENOBLE
OI - L.A. SROMOVSKY
OI - A. FYMAT
OI - G.E. DANIELSON
OI - M. HERMAN

U OF WISCONSIN
U OF LILLE
U OF WISCONSIN
NASA-JPL
NASA-JPL
U OF LILLE

BRIEF DESCRIPTION

THE OBJECTIVES WERE TO LOCATE REGIONS OF RADIATIVE CONVERGENCE AND DIVERGENCE AS A FUNCTION OF ALTITUDE AND TO INDICATE THE HEIGHT AT WHICH SOLAR ENERGY IS ABSORBED BY THE ATMOSPHERE. THIS EXPERIMENT USED A SMALL NET FLUX RADIOMETER ON THE PROBE TARGETED TO THE DAYSIDE OF VENUS TO MEASURE THE NET SOLAR FLUX IN THE 0.2 TO 4 MICROMETER REGION. THE TWO PROBES TARGETED TO THE NIGHTSIDE OF THE PLANET CARRIED NET INFRARED FLUX SENSORS COVERING THE 1 TO 25 MICROMETER REGION. THE INSTRUMENT WEIGHED ABOUT 0.4 KG AND USED 2.2 W OF POWER.

***** PIONEER VENUS PROBE SM3*****

SPACECRAFT COMMON NAME- PIONEER VENUS PROBE SM3
ALTERNATE NAMES- PIONEER VENUS 1978

NSSDC ID- 78-078G

LAUNCH DATE- 08/08/78 WEIGHT- 75. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- VENUS PROBE

PERSONNEL
MG - F.D. KOCHENDORFER NASA HEADQUARTERS
SC - M.A. MITZ NASA HEADQUARTERS
PM - C.F. HALL NASA-ARC
PS - L. COLIN NASA-ARC

BRIEF DESCRIPTION

THIS SPACECRAFT WAS THE THIRD SMALL PROBE OF THE PIONEER-VENUS MULTIPROBE MISSION. ON THIS MISSION FOUR INSTRUMENTED ATMOSPHERIC ENTRY PROBES WERE CARRIED BY A SPACECRAFT BUS TO THE VICINITY OF VENUS FOR DESCENT THROUGH THE ATMOSPHERE TO THE PLANETARY SURFACE. TWO SMALL PROBES ENTERED ON THE NIGHTSIDE, AND ONE SMALL PROBE AND ONE LARGE PROBE ENTERED ON THE DAYSIDE OF THE PLANET. THE SPACECRAFT BUS ENTERED THE ATMOSPHERE AND OBTAINED ATMOSPHERIC COMPOSITION DATA UNTIL BURNUP. INVESTIGATIONS EMPHASIZE THE STUDY OF THE STRUCTURE COMPOSITION AND NATURE OF THE ATMOSPHERE DOWN TO THE SURFACE, AND OF THE CLOUDS, THE RADIATION FIELD AND ENERGY EXCHANGE IN THE LOWER ATMOSPHERE, AND LOCAL INFORMATION ON THE ATMOSPHERIC CIRCULATION PATTERN. A SISTER MISSION, PIONEER VENUS ORBITER, PLACED AN ORBITING SPACECRAFT AROUND VENUS 2 WEEKS BEFORE THE PROBES WERE RELEASED. SIMULTANEOUS MEASUREMENTS BY THE PROBES AND ORBITER PERMITTED RELATING SPECIFIC LOCAL MEASUREMENTS TO THE GENERAL STATE OF THE PLANET AND ITS ENVIRONMENT AS OBSERVED FROM ORBIT.

----- PIONEER VENUS PROBE SM3, COUNSELMAN-----

INVESTIGATION NAME- DIFFERENTIAL VERY-LONG-BASELINE
INTERFEROMETRIC TRACKING

NSSDC ID- 78-078G-03 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
METEOROLOGY
AERONOMY

PERSONNEL
PI - C.C. COUNSELMAN MASS INST OF TECH
OI - I.I. SHAPIRO MASS INST OF TECH
OI - R.G. PRINN MASS INST OF TECH
OI - J. CHARNEY MASS INST OF TECH
OI - G. PETTENGILL MASS INST OF TECH

BRIEF DESCRIPTION

THIS EXPERIMENT INVOLVED APPLYING DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRY TECHNIQUES TO THE RADIO SIGNALS FROM THE ENTRY PROBE AND BUS IN ORDER TO INFER OR PLACE UPPER LIMITS ON WIND SPEEDS IN THE LOWER ATMOSPHERE. THESE RESULTS WERE USED IN MODELING THE CIRCULATION PATTERNS OF VENUS' ATMOSPHERE. DATA TAKEN PRIOR TO PROBE ENTRY WERE USED, WHERE FEASIBLE, TO INFER CHARACTERISTICS OF VENUS' GRAVITY FIELD FOR USE WITH PROBE ENTRY OPERATIONS AS WELL AS IN LATER SCIENTIFIC EVALUATION.

----- PIONEER VENUS PROBE SM3, RAGENT-----

INVESTIGATION NAME- CLOUD EXTENT, STRUCTURE, AND
DISTRIBUTION

NSSDC ID- 78-078G-02 INVESTIGATIVE PROGRAM
CODE SL/CO-OP
INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY
METEOROLOGY

PERSONNEL
PI - B. RAGENT NASA-ARC
PI - J.E. BLAMONT CNRS-SA

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A NEPHELOMETER TO MEASURE THE ENERGY BACKSCATTERED FROM CLOUD PARTICLES. IT USED A PULSED GALLIUM ARSENIDE LASER DIODE TO ILLUMINATE THE CLOUDS. THE ALTITUDE HISTORY OF THE BACKSCATTERED SIGNAL INDICATED THE PRESENCE AND VERTICAL EXTENT OF CLOUDS ALONG THE TRAJECTORY. COMPARISONS WITH THE MEASUREMENTS FROM THE OTHER PROBES INDICATED THE SPATIAL VARIABILITY OF THE CLOUD STRUCTURE. THE LASER OPERATED AT ABOUT 9000 A. THE EXPERIMENT WEIGHED ABOUT 0.6 KG AND USED ABOUT 1.3 W OF POWER.

----- PIONEER VENUS PROBE SM3, SEIFF-----

INVESTIGATION NAME- ATMOSPHERE STRUCTURE

NSSDC ID- 78-078G-01 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL
PI - A. SEIFF NASA-ARC
OI - S.C. SOMMER NASA-ARC
OI - R.C. BLANCHARD NASA-ARC
OI - D.B. KIRK NASA-ARC
OI - R.E. YOUNG NASA-ARC
OI - J. DERR US GEOLOGICAL SURVEY

BRIEF DESCRIPTION

THE INSTRUMENTS FOR THIS EXPERIMENT INCLUDED A THREE-AXIS ACCELEROMETER, PRESSURE SENSORS, AND TEMPERATURE SENSORS. THEY WERE BASED ON THE TECHNOLOGY DEMONSTRATED BY THE PAET ROCKET VEHICLE (PLANETARY ATMOSPHERE EXPERIMENT TEST R7106-2001). THE MEASUREMENTS WERE USED TO CONSTRUCT A PROFILE OF ATMOSPHERE STATE PROPERTIES FOR THE TRAJECTORY FROM THE SURFACE TO APPROXIMATELY 140 KM ALTITUDE. THEY WERE ALSO USED TO DETERMINE VERTICAL WIND VELOCITY, HORIZONTAL WIND VELOCITY, AND TURBULENCE. BY COMPARING ATMOSPHERE CONDITIONS ALONG THIS TRAJECTORY WITH THOSE MEASURED BY THE OTHER PROBES, CIRCULATION MODELS OF THE ATMOSPHERE WERE DETERMINED. THE INSTRUMENTS WEIGHED ABOUT 1.2 KG AND CONSUMED ABOUT 3.4 W OF POWER.

----- PIONEER VENUS PROBE SM3, SUOMI-----

INVESTIGATION NAME- INFRARED RADIOMETER

NSSDC ID- 78-078G-04 INVESTIGATIVE PROGRAM
CODE SL/CO-OP
INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY

PERSONNEL
PI - V.E. SUOMI U OF WISCONSIN
OI - J. LENOBLE U OF LILLE
OI - A. FYMAT NASA-JPL
OI - L.A. SROMOVSKY U OF WISCONSIN
OI - G.E. DANIELSON NASA-JPL
OI - M. HERMAN U OF LILLE

BRIEF DESCRIPTION

THE OBJECTIVES WERE TO LOCATE REGIONS OF RADIATIVE CONVERGENCE AND DIVERGENCE AS A FUNCTION OF ALTITUDE AND TO INDICATE THE HEIGHT AT WHICH SOLAR ENERGY IS ABSORBED BY THE ATMOSPHERE. THIS EXPERIMENT USED A SMALL NET FLUX RADIOMETER ON THE PROBE TARGETED TO THE DAYSIDE OF VENUS TO MEASURE THE NET SOLAR FLUX IN THE 0.2- TO 4-MICROMETER REGION. THE TWO PROBES TARGETED TO THE NIGHTSIDE OF THE PLANET CARRY NET INFRARED FLUX SENSORS COVERING THE 1- TO 25 MICROMETER REGION. THE INSTRUMENT WEIGHED ABOUT 0.4 KG AND USED 2.2 W OF POWER.

***** PROGNOZ 6*****

SPACECRAFT COMMON NAME- PROGNOZ 6
ALTERNATE NAMES- 10370

NSSDC ID- 77-093A

LAUNCH DATE- 09/22/77 WEIGHT- 910. KG
LAUNCH SITE- TYURATAM (BAIKONUR COSMODROME), U.S.S.R.
LAUNCH VEHICLE- A-2-E

SPONSORING COUNTRY/AGENCY
U.S.S.R. SAS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 09/23/77
ORBIT PERIOD- 5684. MIN INCLINATION- 65. DEG
PERIAPSIS- 498. KM ALT APOAPSIS- 197900. KM ALT

PERSONNEL
PM - UNKNOWN IKI
PS - A. GALEEV

BRIEF DESCRIPTION

THE SPACECRAFT WAS A MEMBER OF A CONTINUING SERIES TO MEASURE CHARGED PARTICLES, PLASMA, MAGNETIC FIELDS, AND SOLAR ELECTROMAGNETIC RADIATION. THIS MISSION WAS PART OF THE SOCIALIST COUNTRIES' CONTRIBUTION TO THE INTERNATIONAL MAGNETOSPHERIC STUDY. THE SPECIFIC SCIENTIFIC GOALS OF THIS MISSION WERE: (1) ACCELERATION PROCESSES IN THE SOLAR CORONA AND FLARE ACCELERATION OF CHARGED PARTICLES, (2) PROPAGATION OF ACCELERATED PARTICLES FROM THE SOLAR CORONA TO INTERPLANETARY SPACE, (3) PARTICLE ACCELERATION FROM INTERPLANETARY SHOCK FRONTS, (4) CHEMICAL AND CHARGE COMPOSITION OF THE SOLAR WIND AND SOLAR ENERGETIC PARTICLES, (5) INSTABILITY PROCESSES IN INTERPLANETARY PLASMA AND WAVE ENVIRONMENTS, (6) PROPAGATION AND PENETRATION INTO THE MAGNETOSPHERE OF SOLAR PLASMA AND ENERGETIC PARTICLES, (7) MAGNETOTAIL PLASMA DYNAMICS DURING SUBSTORMS, (8) DISCRETE GAMMA RAY LINES OF SOLAR AND GALACTIC ORIGIN, AND (9) UV-EMISSION IN THE UPPER ATMOSPHERE AND THE INTERPLANETARY MEDIUM. DATA WERE OBTAINED FROM A 5 MEGABIT

STORAGE DURING EACH PERIGEE SO THAT CONTINUOUS DATA ACQUISITION OVER THE WHOLE ORBIT WAS ACHIEVED.

----- PROGNOZ 6, EROSHENKO-----

INVESTIGATION NAME- THREE-AXIS FLUXGATE MAGNETOMETER

NSSDC ID- 77-093A-01 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - YE.G. EROSHENKO

IZMIRAN

BRIEF DESCRIPTION

A THREE-AXIS FLUXGATE MAGNETOMETER WAS USED TO MEASURE VECTOR MAGNETIC FIELDS FROM 1 TO 60 NT (GAMMAS) WITH AN INTENSITY RESOLUTION OF 0.5 NT. BOTH INTERPLANETARY AND GEOMAGNETIC TAIL FIELDS WERE CAPABLE OF BEING MEASURED.

----- PROGNOZ 6, ESTULIN-----

INVESTIGATION NAME- GAMMA-RAY SPECTROMETER

NSSDC ID- 77-093A-05 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL

PI - I.V. ESTULIN
PI - G. VEDRENNE

IKI
CESR

BRIEF DESCRIPTION

THIS INVESTIGATION WAS CONCERNED WITH THE COSMIC GAMMA RAY SPECTRUM AND GAMMA RAY BURSTS. THE ENERGY RANGE COVERED WAS 0.1 TO 3 MEV. ONE DETECTOR OBSERVED THE SUN AND ANOTHER WAS POINTED IN THE ANTI-SOLAR DIRECTION. THE MAIN DETECTOR WAS AN OMNIDIRECTIONAL PHOSWICH SYSTEM FROM WHICH PULSE HEIGHT ANALYSIS WAS OBTAINED. THE SOLAR VIEWING DETECTOR WAS USED TO OBTAIN SOLAR BURSTS AS WELL AS SERVING AS A DISCRIMINATOR FOR THE GAMMA RAY BURST MEASUREMENTS.

----- PROGNOZ 6, GRINGAUZ-----

INVESTIGATION NAME- PLASMA DETECTOR

NSSDC ID- 77-093A-02 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - K.I. GRINGAUZ

IKI

BRIEF DESCRIPTION

THIS INVESTIGATION WAS INVOLVED WITH THE SOLAR WIND PLASMA AND THE COLD PLASMA IN THE MAGNETOSPHERE. LARGE-ANGLE FARADAY CUPS WERE EMPLOYED TO MEASURE BOTH IONS AND ELECTRONS. IONS WERE MEASURED IN THE ENERGY RANGE 0.01 TO 5.4 KEV IN 16 CHANNELS AND ELECTRONS WERE SENSED IN 16 CHANNELS IN THE RANGE 10 TO 300 EV. ION DENSITIES FROM 0.1 TO 50/CC, TEMPERATURES FROM 20 TO 20,000 K, AND BULK VELOCITY FROM 240 TO 870 KM/S WERE MEASURED. THE DENSITY OF ELECTRONS AND THEIR TEMPERATURES WERE ALSO MEASURED.

----- PROGNOZ 6, KACHAROV-----

INVESTIGATION NAME- SOLAR X-RAYS

NSSDC ID- 77-093A-03 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
X-RAY ASTRONOMY

PERSONNEL

PI - G.YE. KACHAROV

LENGRAD INST PHYS TECH

BRIEF DESCRIPTION

SOLAR X-RAYS IN THE PHOTON ENERGY FROM 2 TO 511 KEV WERE MEASURED AND THE SPECTRUM OBTAINED. STANDARD SODIUM IODIDE CRYSTALS AND ANTICOINCIDENCE TECHNIQUES WERE EMPLOYED.

----- PROGNOZ 6, KURT-----

INVESTIGATION NAME- INTERPLANETARY UV EMISSION PHOTOMETER -
HYDROGEN AND HELIUM

NSSDC ID- 77-093A-08 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
INTERPLANETARY PHYSICS
SOLAR PHYSICS

PERSONNEL

PI - V.G. KURT
PI - J.L. BERTAUX

IKI
CNRS-SA

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION WERE TO (1) STUDY THE NEUTRAL HYDROGEN AND HELIUM DENSITY AND TEMPERATURE IN THE INTERPLANETARY MEDIUM, (2) STUDY THE RATIO OF NEUTRAL HELIUM TO ATOMIC HYDROGEN, (3) OBSERVE HELIUM IONS IN THE PLASMASPHERE AND THE INTERPLANETARY MEDIUM, AND (4) STUDY THE GEOCORONA. THE INSTRUMENT CONSISTED OF THIN FILM FILTER PHOTOMETERS USING SPIRALTRONS TO MEASURE THE 304 Å (He+), 584 Å (He), AND THE SOLAR 584 Å LINES AND AN ABSORPTION CELL TO MEASURE THE 1216 Å LYMAN ALPHA LINE.

----- PROGNOZ 6, LICKIN-----

INVESTIGATION NAME- SOLAR X-RAY SPECTROMETER

NSSDC ID- 77-093A-07 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

PI - O.B. LICKIN
PI - B. VALNICEK

IKI
ASTRONOMICAL INST

BRIEF DESCRIPTION

SOLAR X-RAYS IN THE 1 TO 200 KEV RANGE WERE MEASURED IN 5 CHANNELS. THE EXACT INSTRUMENTATION HAS NOT BEEN SPECIFIED BUT SODIUM IODIDE CRYSTALS AND PROBABLY PROPORTIONAL COUNTERS WERE USED.

----- PROGNOZ 6, LOGACHEV-----

INVESTIGATION NAME- ELECTRON AND PROTON SPECTROMETER

NSSDC ID- 77-093A-04 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS
INTERPLANETARY PHYSICS

PERSONNEL

PI - YU.I. LOGACHEV

INST NUCLEAR PHYSICS

BRIEF DESCRIPTION

THE SPECTRUM OF PROTONS AND ELECTRONS IN THE ENERGY RANGE 0.03 TO 10 MEV WAS MEASURED. THE DETAILS OF THE INSTRUMENT HAVE NOT BEEN PROVIDED.

----- PROGNOZ 6, LUTSENKO-----

INVESTIGATION NAME- ENERGETIC PARTICLES CHARGE AND MASS
COMPOSITION

NSSDC ID- 77-093A-11 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS
PARTICLES AND FIELDS

PERSONNEL

PI - V.N. LUTSENKO
PI - S. FISCHER

IKI
ASTRONOMICAL INST

BRIEF DESCRIPTION

THE ENERGY AND MASS COMPOSITION OF CHARGED PARTICLES WERE MEASURED IN THE RANGE 5 TO 50 MEV/NUCLEON. THE INSTRUMENT (SOVIET-CZECHOSLOVAK EXPERIMENT TP-2) WAS A THREE-ELEMENT SOLID STATE DOUBLE DE/DX-E TELESCOPE WITH A PLASTIC SCINTILLATOR ANTICOINCIDENCE CUP. THE TELESCOPE AXIS POINTED TOWARD THE SUN. DETECTOR THICKNESSES ARE 100 MICRONS (D1, D2) AND 1800 MICRONS (D3). PULSES FROM CHARGED PARTICLES WITH Z FROM 1 TO 18 WERE ANALYZED. CHANNELS FOR NINE TYPES OF COINCIDENCE EVENTS HAVE BEEN IDENTIFIED. ENERGY RANGES HAVE BEEN IDENTIFIED FOR PROTONS AS P1 (1.4-3.4 MEV) AND P3 (5-18 MEV), AND FOR ALPHA PARTICLES AS A1 (1.4-3.4 MEV/NUCLEON) AND A3 (5-18 MEV/NUCLEON). GEOMETRIC FACTORS ARE 1.2 SQ CM-SR FOR P1, A1, AND 0.1 SQ CM-SR FOR P2, P3, A2, A3.

----- PROGNOZ 6, PISARENKO-----

INVESTIGATION NAME- ENERGETIC ELECTRON AND PROTON
SPECTROMETER

NSSDC ID- 77-093A-09 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY PHYSICS
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - N.F. PISARENKO
PI - L. TREGER

IKI
CENS

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTED OF A FOUR-ELEMENT SOLID-STATE DETECTOR TELESCOPE SURROUNDED BY A PLASTIC SCINTILLATION ANTI-COINCIDENCE SYSTEM. THE TELESCOPE ENTRANCE ELEMENT WAS A 300-MICROMETER-THICK SURFACE BARRIER DETECTOR (300 SQ MM). THE OTHER DETECTORS WERE LITHIUM-DRIFTED SILICON OF 2 MM THICKNESS WITH AREAS OF 500, 750, AND 1250 SQ MM. THE HALF ANGLE OF THE CONICAL FIELD OF VIEW WAS 22 DEG AND THE TELESCOPE AXIS VIEWED AT AN ANGLE OF 30 DEG TO THE SUN. USING VARIOUS LOGIC CIRCUITS AND DISCRIMINATORS, THE FOLLOWING CHANNELS OF DATA WERE PROVIDED: (A) PROTONS - 2.1-7.6, 7.6-12.5, 12.5-28.5, 28.5-72, 72-150, 150-500, AND .GT. 500 MEV, (B) ELECTRONS - 0.3-1.3, 1.3-3, 3-15, AND .GT. 20 MEV, (C) ALPHAS 30-75 MEV.

----- PROGNOZ 6, SEVERNY-----

INVESTIGATION NAME- UV EMISSION SPECTROMETER

NSSDC ID- 77-093A-10

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
AERONOMY

PERSONNEL

PI - A.B. SEVERNY
PI - G.C. COURTES

CRIMEAN ASTROPHYS OBS
CNRS-LAS

BRIEF DESCRIPTION

AN ULTRAVIOLET EMISSION SPECTROMETER TO MEASURE BOTH ATMOSPHERIC AND INTERPLANETARY SPECTRA WAS USED. THE DETAILS OF THE INSTRUMENT HAVE NOT BEEN SPECIFIED.

----- PROGNOZ 6, SKREBTSOV-----

INVESTIGATION NAME- PROTON AND HEAVY NUCLEI SPECTROMETER

NSSDC ID- 77-093A-06

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - G.P. SKREBTSOV

LENGRAD INST PHYS TECH

BRIEF DESCRIPTION

MEASUREMENTS OF ENERGETIC PARTICLES WITHIN 0.8 TO 15 MEV/NUCLEON FOR Z GREATER THAN OR EQUAL TO 3 AND 0.2 TO 7.2 MEV/NUCLEON FOR Z EQUAL TO 1 AND 2 WERE OBTAINED. DETAILS OF THE INSTRUMENTATION HAVE NOT BEEN PROVIDED.

***** PROGNOZ 7*****

SPACECRAFT COMMON NAME- PROGNOZ 7

ALTERNATE NAMES- 11088

NSSDC ID- 78-101A

LAUNCH DATE- 10/30/78

LAUNCH SITE- UNKNOWN, U.S.S.R.

LAUNCH VEHICLE- UNKNOWN

WEIGHT- KG

SPONSORING COUNTRY/AGENCY

U.S.S.R.

UNKNOWN

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 5889. MIN
PERIAPSIS- 483. KM ALT

EPOCH DATE- 10/31/78
INCLINATION- 65. DEG
APOAPSIS- 202965. KM ALT

PERSONNEL

PS - A.A. GALEEV

IKI

BRIEF DESCRIPTION

THIS SPACECRAFT WAS A MEMBER OF A CONTINUING SERIES TO MEASURE CHARGED PARTICLES, PLASMA, MAGNETIC FIELDS, AND SOLAR ELECTROMAGNETIC RADIATION. INFORMATION ABOUT THE EXPERIMENT COMPLEMENT HAS BEEN REQUESTED BUT NOT YET RECEIVED. IT IS EXPECTED THAT THE EXPERIMENTS WERE SIMILAR TO THOSE ON PROGNOZ 4, 5, OR 6.

----- PROGNOZ 7, ESTULIN-----

INVESTIGATION NAME- GAMMA-RAY SPECTROMETER

NSSDC ID- 78-101A-03

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL
PI - I.V. ESTULIN
PI - G. VEDRENNE

IKI
CESR

BRIEF DESCRIPTION

THIS INVESTIGATION WAS CONCERNED WITH THE COSMIC GAMMA-RAY SPECTRUM AND GAMMA-RAY BURSTS. THE ENERGY RANGE COVERED WAS 0.08 TO 1 MEV IN SIX CHANNELS. ONE DETECTOR OBSERVED THE SUN AND ANOTHER WAS POINTED IN THE ANTI-SOLAR DIRECTION. THE MAIN DETECTOR WAS AN OMNIDIRECTIONAL PHOSWICH SYSTEM FROM WHICH PULSE HEIGHT ANALYSIS WAS OBTAINED. THE SOLAR VIEWING DETECTOR WAS USED TO OBTAIN SOLAR BURSTS AS WELL AS SERVING AS A DISCRIMINATOR FOR THE GAMMA-RAY BURST MEASUREMENTS. THE BURST MEASUREMENT HAD RAPID MEMORY TO ALLOW FOR 2 MS TIME RESOLUTION.

----- PROGNOZ 7, HULTQVIST-----

INVESTIGATION NAME- MAGNETOSPHERIC ION COMPOSITION SPECTROMETER

NSSDC ID- 78-101A-02

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - B.K.G. HULTQVIST
OI - N.F. PISARENKO

KIRUNA GEOPHYS INST
IKI

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTED OF THREE MASS ANALYZERS WITH WIEN FILTERS, THREE ION ELECTROSTATIC ANALYZERS, AND THREE ELECTRON ELECTROSTATIC ANALYZERS. MASSES BETWEEN 1 AND 20 U WITH ENERGIES BETWEEN 0.2 AND 16 KEV WERE MEASURED AND THE DISTRIBUTION OF ELECTRONS AND IONS BETWEEN 0.05 AND 40 KEV WERE OBTAINED.

----- PROGNOZ 7, VAISBERG-----

INVESTIGATION NAME- SELECTIVE COMBINED PLASMA SPECTROMETER (SCS)

NSSDC ID- 78-101A-01

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - O.L. VAISBERG

IKI

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTED OF: (1) THREE CYLINDRICAL ELECTROSTATIC ANALYZERS FOR MEASURING THE ION SPECTRUM FROM 0.25 TO 5 KEV/CHARGE, (2) TWO COMBINED ANALYZERS WITH WIEN FILTERS AND ELECTROSTATIC ANALYZERS FOR SELECTIVE MEASUREMENTS OF PROTONS IN THE SAME ENERGY RANGE, (3) TWO CYLINDRICAL ELECTROSTATIC ANALYZERS FOR MEASURING ELECTRONS FROM 10 TO 200 EV, AND (4) THREE INTEGRAL ION FLUX DETECTORS LOOKING IN DIFFERENT DIRECTIONS SO THAT THE TOTAL SOLAR WIND FLUX AND DIRECTION COULD BE DETERMINED. PLASMA MEASUREMENTS IN THE INTERPLANETARY MEDIUM AND THE MAGNETOSPHERE WERE CARRIED OUT.

***** S3-3*****

SPACECRAFT COMMON NAME- S3-3

ALTERNATE NAMES- SESP S74-2A, S74-2
SS74-2A

NSSDC ID- 76-065B

LAUNCH DATE- 07/08/76

LAUNCH SITE- VANDENBERG AFB, UNITED STATES

LAUNCH VEHICLE- UNKNOWN

WEIGHT- KG

SPONSORING COUNTRY/AGENCY

UNITED STATES

DOD-USAF

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 176.6 MIN
PERIAPSIS- 246. KM ALT

EPOCH DATE- 07/08/76
INCLINATION- 97.5 DEG
APOAPSIS- 7856. KM ALT

PERSONNEL

PM - SAMS0
PS - J.R. STEVENS

USAF-LAS
AEROSPACE CORP

BRIEF DESCRIPTION

THIS SPACECRAFT WAS A SMALL OBSERVATORY IN A NEAR-POLAR ORBIT WITH EIGHT DIFFERENT SENSORS ON BOARD. IT WAS DESIGNED TO OBSERVE VARIOUS MAGNETOSPHERIC PARAMETERS AND THEIR INTERRELATIONSHIPS. SENSORS, WHICH OBSERVED ENERGETIC PROTONS AND ALPHA PARTICLES, ALSO PROVIDED REAL-TIME OBSERVATIONS FOR USE BY THE SPACE FORECAST FACILITY (USAF-AWS).

----- S3-3, FENNELL-----

INVESTIGATION NAME- ION-ELECTRON MASS SPECTROMETER

NSSDC ID- 76-065B-08

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - J.F. FENNELL

AEROSPACE CORP

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURED THE H-HE PARTICLE DISTRIBUTION AT INJECTION INTO RADIATION BELTS AND THROUGHOUT THE OUTER REGIONS OF THE MAGNETOSPHERE. THIS INSTRUMENT MEASURED THE FLUX OF $1H^+$, $4He^{++}$ IN THE ENERGY RANGE FROM 0.09 TO 4 KEV/Q, AND ELECTRONS FROM 0.17 TO 8.4 KEV.

----- S3-3, MOZER-----

INVESTIGATION NAME- DC ELECTRIC FIELDS

NSSDC ID- 76-065B-01

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - F.S. MOZER

U OF CALIF, BERKELEY

BRIEF DESCRIPTION

THIS EXPERIMENT MADE VECTOR ELECTRIC FIELD MEASUREMENTS, UNDER VARIOUS CONDITIONS, AT A VARIETY OF MAGNETOSPHERIC LOCATIONS. THE MEASUREMENTS WERE USED IN STUDYING VARIATIONS IN RADIO FREQUENCY, WAVE PROPAGATION, OPTICAL EMISSIONS, ETC., OBSERVED WITH OTHER EXPERIMENTAL EQUIPMENT.

----- S3-3, SHARP-----

INVESTIGATION NAME- LOW-ENERGY PARTICLE SPECTROMETER

NSSDC ID- 76-065B-02

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS

PERSONNEL

PI - R.D. SHARP

LOCKHEED PALO ALTO

BRIEF DESCRIPTION

THIS INSTRUMENT CONSISTED OF AN ELECTROSTATIC ANALYZER FOLLOWED BY A CROSSED ELECTRIC-MAGNETIC FIELD VELOCITY SELECTOR TO MEASURE IONS FROM 1 TO 32 U AND ABOVE 32 U. THE ENERGY/Q RANGED FROM 0.5 TO 16 KEV. ELECTRONS WERE MEASURED FROM 0.07 TO 24 KEV. OBSERVATIONS WERE MADE PERPENDICULAR TO THE ORBIT PLANE.

----- S3-3, VAMPOLA-----

INVESTIGATION NAME- ENERGETIC ELECTRON MAGNETIC SPECTROMETER

NSSDC ID- 76-065B-07

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - A.L. VAMPOLA

AEROSPACE CORP

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A 12-CHANNEL MAGNETIC SPECTROMETER USED TO OBTAIN VALUES AND MONITOR CHANGES IN THE EQUATORIAL PITCH-ANGLE AND ENERGY DISTRIBUTION OF 0.012- TO 1.6-MEV ELECTRONS AS A FUNCTION OF MAGNETIC ACTIVITY. THE EXPERIMENT ALSO MEASURED PROTONS FROM 0.08 TO 3 MEV AND ALPHA PARTICLES ABOVE 4 MEV.

----- S3-3, WILDMAN-----

INVESTIGATION NAME- ELECTRIC FIELDS-ION DRIFT

NSSDC ID- 76-065B-05

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
IONOSPHERES

PERSONNEL

PI - P.J.L. WILDMAN
OI - R.C. SAGALYN
OI - M. SMIDDY

USAF GEOPHYS LAB
USAF GEOPHYS LAB
USAF GEOPHYS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A SPHERICAL ELECTRON SENSOR AND TWO ARRAYS OF FOUR PLANAR APERTURE ION SENSORS. BOTH IONS AND ELECTRONS FROM 0.1 TO 30 EV WERE MEASURED. ELECTRON DENSITIES FROM 10 TO 3.0 E^+S/CC AND TEMPERATURES FROM 500 TO 10,000 DEG WERE OBTAINED. FOR IONS, THE DENSITY COULD BE OBTAINED BELOW ALTITUDE OF 5,000 KM.

----- S3-3, YATES-----

INVESTIGATION NAME- LOW-ENERGY PROTON SPECTROMETERS

NSSDC ID- 76-065B-03

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - K. YATES

USAF GEOPHYS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT OBSERVED PROTONS (0.1 TO 100 MEV) TRAPPED WITHIN THE GEOMAGNETIC CAVITY. DATA WERE MADE AVAILABLE FOR REAL-TIME USE AND RECORDED FOR LONG-TERM STUDY. THE DATA WERE USED TO AID THE USAF AIR WEATHER SERVICE IN PROVIDING SPACE ENVIRONMENT FORECASTS AND TO DEVELOP IMPROVED TECHNIQUES FOR PERFORMING THESE FORECASTS.

----- S3-3, YATES-----

INVESTIGATION NAME- PROTON TELESCOPE

NSSDC ID- 76-065B-04

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - K. YATES

USAF GEOPHYS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT OBSERVED ALPHA-PARTICLE POPULATION (20-100 MEV) WITHIN THE GEOMAGNETIC CAVITY. DATA WERE MADE AVAILABLE FOR REAL-TIME USE AND ALSO RECORDED FOR LONG-TERM STUDY. THE PRIMARY USE OF THE DATA WAS BY USAF AIR WEATHER SERVICE IN PROVIDING SPACE ENVIRONMENT FORECASTS AND IN DEVELOPING IMPROVED TECHNIQUES FOR THESE FORECASTS.

***** SAGE*****

SPACECRAFT COMMON NAME- SAGE

ALTERNATE NAMES- AEM-B, STRAT AERO AND GAS EXP
APPL EXPL MISSION B, 11270

NSSDC ID- 79-013A

LAUNCH DATE- 02/18/79

WEIGHT- 148.7 KG

LAUNCH SITE- Wallops Flight Center, UNITED STATES

LAUNCH VEHICLE- SCOUT-F

SPONSORING COUNTRY/AGENCY

UNITED STATES

NASA-OSTA

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC

EPOCH DATE- 02/19/79

ORBIT PERIOD- 96.8 MIN

INCLINATION- 54.9 DEG

PERIAPSIS- 547.5 KM ALT

APOA- 660.2 KM ALT

PERSONNEL

MG - D.S. DILLER
SC - S.H. MELFI
PM - C.W. MACKENZIE
PS - R.S. FRASER

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE) SPACECRAFT SERVED AS A SMALL, VERSATILE, LOW-COST PLATFORM CARRYING A SINGLE EXPERIMENT DESIGNED TO DETERMINE THE SPATIAL DISTRIBUTION OF STRATOSPHERIC AEROSOLS AND OZONE ON A GLOBAL SCALE. THE SAGE OBTAINED AEROSOL AND OZONE INFORMATION BY MEASURING THE ATTENUATION OF SOLAR RADIATION BY THE EARTH'S ATMOSPHERE AT FOUR SEPARATE WAVELENGTHS.

----- SAGE, MCCORMICK-----

INVESTIGATION NAME- STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE)

ORIGINAL PAGE IS
OF POOR QUALITY

C-2

NSSDC ID- 79-013A-01

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
UPPER ATMOSPHERE RESEARCH
METEOROLOGY

PERSONNEL
PI - M.P. MCCORMICK

NASA-LARC

BRIEF DESCRIPTION

THE OBJECTIVES OF THE STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE) WERE TO DETERMINE THE SPATIAL DISTRIBUTION OF STRATOSPHERIC AEROSOLS AND OZONE ON A GLOBAL SCALE. SPECIFIC OBJECTIVES WERE -- (1) TO DEVELOP A SATELLITE-BASED REMOTE SENSING TECHNIQUE FOR STRATOSPHERIC AEROSOLS AND OZONE, (2) TO MAP AEROSOL AND OZONE CONCENTRATIONS ON A TIME SCALE SHORTER THAN MAJOR STRATOSPHERIC CHANGES, (3) TO LOCATE STRATOSPHERIC AEROSOL AND OZONE SOURCES AND SINKS, (4) TO MONITOR CIRCULATION AND TRANSFER PHENOMENA, (5) TO OBSERVE HEMISPHERE DIFFERENCES, AND (6) TO INVESTIGATE THE OPTICAL PROPERTIES OF AEROSOLS AND ASSESS THEIR EFFECTS ON GLOBAL CLIMATE. THE SAGE INSTRUMENT CONSISTED OF A GREGORIAN TELESCOPE AND A DETECTOR SUBASSEMBLY WHICH MEASURED THE ATTENUATION OF SOLAR RADIATION AT FOUR WAVELENGTHS (.35, .46, .6, AND 1.0 MICROMETERS) DURING SOLAR OCCULTATION. AS THE SPACECRAFT EMERGED FROM THE EARTH'S SHADOW, THE SENSOR SCANNED THE EARTH'S ATMOSPHERE FROM THE HORIZON UP, AND MEASURED THE ATTENUATION OF SOLAR RADIATION BY DIFFERENT ATMOSPHERIC LAYERS. THIS PROCEDURE WAS REPEATED DURING SPACECRAFT SUNSET. TWO VERTICAL SCANNINGS WERE OBTAINED DURING EACH ORBIT, WITH EACH SCAN REQUIRING APPROXIMATELY 1 MIN OF TIME TO COVER THE ATMOSPHERE ABOVE THE TROPOSPHERE. THE INSTRUMENT HAD A FIELD OF VIEW OF APPROXIMATELY 1 MIN OF ARC WHICH RESULTED IN A VERTICAL RESOLUTION OF LESS THAN 1 KM.

***** SAS-C*****

SPACECRAFT COMMON NAME- SAS-C
ALTERNATE NAMES- PL-743D, SAS 3
EXPLORER 53

NSSDC ID- 75-037A

LAUNCH DATE- 05/07/75 WEIGHT- 193. KG
LAUNCH SITE- SAN MARCO PLATFORM, OFF COAST OF KENYA
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 94.9 MIN
PERIAPSIS- 509. KM ALT

EPOCH DATE- 05/08/75
INCLINATION- 3.0 DEG
APOAPSIS- 516. KM ALT

PERSONNEL
MG - J.R. HOLTZ
SC - N.G. ROMAN
PM - J.E. KUPPERIAN, JR.
PS - C.E. FICHEL

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

SAS-C WAS THE THIRD OF A SERIES OF SMALL SPACECRAFT WHOSE OBJECTIVES WERE TO SURVEY THE CELESTIAL SPHERE FOR SOURCES RADIATING IN THE X-RAY, GAMMA-RAY, UV, AND OTHER SPECTRAL REGIONS. THE PRIMARY MISSIONS OF SAS 3 WERE TO MEASURE THE X-RAY EMISSION OF DISCRETE EXTRAGALACTIC SOURCES, TO MONITOR THE INTENSITY AND SPECTRA OF GALACTIC X-RAY SOURCES FROM 0.2 TO 60 KEV, AND TO MONITOR THE X-RAY INTENSITY OF SCORPIO-X-1. THE SPACECRAFT WAS LAUNCHED FROM THE SAN MARCO PLATFORM OFF THE COAST OF KENYA, AFRICA, INTO A NEAR-CIRCULAR, EQUATORIAL ORBIT. FOUR SOLAR PADDLES WERE USED IN CONJUNCTION WITH A 12-CELL, NICKEL-CADMIUM BATTERY TO PROVIDE 65 W OF AVERAGE POWER OVER THE ENTIRE ORBIT. THE SPACECRAFT WAS STABILIZED ALONG THE Z-AXIS AND ROTATED AT ABOUT 0.1 DEG/S. CHANGES TO THE SPIN AXIS ORIENTATION WERE BY GROUND COMMAND, EITHER DELAYED OR IN REAL TIME. THE SPACECRAFT COULD BE MADE TO DITHER BACK AND FORTH PLUS OR MINUS 2.5 DEG ACROSS A SELECTED SOURCE ALONG THE X AXIS AT 0.01 DEG/SEC. THE EXPERIMENTS COULD LOOK ALONG THE Z AXIS OF THE SPACECRAFT, PERPENDICULAR TO IT, OR AT AN ANGLE.

----- SAS-C, CLARK-----

INVESTIGATION NAME- ANALYSIS OF EXTRAGALACTIC X-RAY SOURCES

NSSDC ID- 75-037A-01

INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - G.W. CLARK
OI - H.V.D. BRADY
OI - W.H.G. LEWIN
OI - H.W. SCHNOPPER

MASS INST OF TECH
MASS INST OF TECH
MASS INST OF TECH
MASS INST OF TECH

BRIEF DESCRIPTION

THIS EXPERIMENT DETERMINED THE POSITIONS OF VERY WEAK EXTRAGALACTIC X-RAY SOURCES. THE INSTRUMENT VIEWED A 100-DEG-SQ REGION OF THE SKY AROUND THE DIRECTION OF THE SPIN AXIS OF THE SATELLITE. THE NOMINAL TARGETS FOR A 1-YEAR STUDY WERE -- (1) THE VIRGO CLUSTER OF GALAXIES FOR 4 MONTHS, (2) THE GALACTIC EQUATOR FOR 2 MONTHS, (3) THE ANDROMEDA NEBULA FOR 3 MONTHS, AND (4) THE MAGELLANIC CLOUDS FOR 3 MONTHS. THE INSTRUMENTATION CONSISTED OF ONE 2.5-ARC-MIN AND ONE 4.5-ARC-MIN FWHM MODULATION COLLIMATOR, AS WELL AS PROPORTIONAL COUNTERS SENSITIVE OVER THE ENERGY RANGE FROM 1.5 TO 10 KEV. THE EFFECTIVE AREA OF EACH COLLIMATOR WAS ABOUT 225 SQ CM. THE ASPECT SYSTEM PROVIDED INFORMATION ON THE ORIENTATION OF THE COLLIMATORS TO AN ACCURACY OF 15 ARC S.

----- SAS-C, CLARK-----

INVESTIGATION NAME- ANALYSIS OF GALACTIC X-RAY SOURCES

NSSDC ID- 75-037A-02

INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - G.W. CLARK
OI - H.V.D. BRADY
OI - W.H.G. LEWIN
OI - H.W. SCHNOPPER

MASS INST OF TECH
MASS INST OF TECH
MASS INST OF TECH
MASS INST OF TECH

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS EXPERIMENT WERE TO LOCATE GALACTIC X-RAY SOURCES TO 15 ARC S AND TO MONITOR THESE SOURCES FOR INTENSITY VARIATIONS. THE SOURCE POSITIONS WERE DETERMINED WITH THE USE OF THE MODULATION COLLIMATORS OF THE EXTRAGALACTIC EXPERIMENT DURING THE NOMINAL 2-MONTH OBSERVATION OF THE GALACTIC EQUATOR. THE MONITORING OF THE X-RAY SKY WAS ACCOMPLISHED BY THE USE OF THREE SLAT COLLIMATORS. ONE COLLIMATOR, 1 BY 70 DEG FWHM, WAS ORIENTED PERPENDICULAR TO THE EQUATORIAL PLANE OF THE SATELLITE, WHILE THE OTHER TWO, EACH 0.5 BY 45 DEG FWHM, WERE ORIENTED 30 DEG ABOVE AND 30 DEG BELOW THE FIRST. THE DETECTOR BEHIND EACH COLLIMATOR WAS A PROPORTIONAL COUNTER, SENSITIVE FROM 1.5 TO 13 KEV, WITH AN EFFECTIVE AREA OF ABOUT 100 SQ CM. THE 1.0-DEG COLLIMATOR HAD AN ADDITIONAL COUNTER OF THE SAME AREA, SENSITIVE FROM 8 TO 50 KEV. THREE LINES OF POSITION WERE OBTAINED FOR ANY GIVEN SOURCE WHEN THE SATELLITE WAS BEING SPUN AT A STEADY ROTATION OF 4 ARC MIN/S ABOUT THE Z AXIS.

----- SAS-C, CLARK-----

INVESTIGATION NAME- CONTINUOUS X-RAY FLUCTUATION MONITOR OF SCORPIO X-1

NSSDC ID- 75-037A-03

INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - G.W. CLARK
OI - H.V.D. BRADY
OI - W.H.G. LEWIN
OI - H.W. SCHNOPPER

MASS INST OF TECH
MASS INST OF TECH
MASS INST OF TECH
MASS INST OF TECH

BRIEF DESCRIPTION

A 12-BY-50-DEG FWHM SLAT COLLIMATOR WAS ORIENTED WITH ITS LONG AXIS PERPENDICULAR TO THE SATELLITE SPIN AXIS SUCH THAT A GIVEN POINT ON THE SKY COULD BE MONITORED FOR ABOUT 25 PERCENT OF A ROTATION. THIS COLLIMATOR WAS INCLINED BY 31 DEG WITH RESPECT TO THE EQUATORIAL PLANE OF THE SATELLITE, SO THAT SCORPIO X-1 WAS OBSERVED WHILE THE Z AXIS WAS ORIENTED TO THE VIRGO CLUSTER OF GALAXIES. THE DETECTORS USED IN THIS EXPERIMENT WERE PROPORTIONAL COUNTERS WITH 1-MIL BE WINDOWS. THE ENERGY RANGE WAS FROM 1.0 TO 60 KEV, AND THE TOTAL EFFECTIVE AREA WAS ABOUT 40 SQ CM.

----- SAS-C, CLARK-----

INVESTIGATION NAME- X-RAY ABSORPTION CONTOURS OF THE GALAXY

NSSDC ID- 75-037A-04

INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - G.W. CLARK
OI - H.V.D. BRADY
OI - W.H.G. LEWIN
OI - H.W. SCHNOPPER

MASS INST OF TECH
MASS INST OF TECH
MASS INST OF TECH
MASS INST OF TECH

BRIEF DESCRIPTION

THE DENSITY AND DISTRIBUTION OF INTERSTELLAR MATTER WAS DETERMINED BY MEASURING THE VARIATION IN THE INTENSITY OF THE LOW-ENERGY DIFFUSE X-RAY BACKGROUND AS A FUNCTION OF GALACTIC LATITUDE. A 1-MICROMETER POLYPROPYLENE WINDOW PROPORTIONAL COUNTER WAS USED FOR THE 0.1- TO 0.25-KEV AND 0.5- TO 1.0-KEV ENERGY RANGES, WHILE A 2-MICROMETER TITANIUM WINDOW COUNTER COVERED THE ENERGY RANGE FROM 0.3 TO 0.5 KEV. IN ADDITION, TWO 1-MIL BE WINDOW COUNTERS WERE USED FOR THE 1.0- TO 10-KEV

ENERGY RANGE. THE COLLIMATORS IN THIS EXPERIMENT HAD FIELDS OF VIEW OF 3 DEG FOR THE 1-MICROMETER COUNTER, 2 DEG FOR THE 2-MICROMETER COUNTER, AND 2 DEG FOR THE 1-MIL COUNTERS.

***** SEASAT 1*****

SPACECRAFT COMMON NAME- SEASAT 1
ALTERNATE NAMES- OCEAN DYNAMICS SAT-A, SEA SATELLITE-A
10967, SEASAT-A

NSSDC ID- 78-064A

LAUNCH DATE- 06/27/78 WEIGHT- 1800. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS-AGEN

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 06/28/78
ORBIT PERIOD- 100.7 MIN INCLINATION- 108.0 DEG
PERIAPSIS- 769. KM ALT APOAPSIS- 799. KM ALT

PERSONNEL
MG - S.W. MCCANDLESS, JR. NASA HEADQUARTERS
PM - W.E. GIBERSON NASA-JPL
PS - J.A. DUNNE NASA-JPL

BRIEF DESCRIPTION
THE OCEAN DYNAMICS SATELLITE (SEASAT 1) WAS DESIGNED TO PROVIDE MEASUREMENTS OF WAVE HEIGHT AND DIRECTION SPECTRUM, SURFACE WIND SPEED AND DIRECTION, SEA SURFACE TOPOGRAPHY, AND HIGH RESOLUTION RADAR AND INFRARED IMAGERY OF SELECTED AREAS OF THE OCEAN. THE INSTRUMENT PAYLOAD CONSISTED OF X-BAND COMPRESSED PULSE RADAR ALTIMETER, COHERENT SYNTHETIC APERTURE IMAGING RADAR, MICROWAVE WIND SCATTEROMETER, SCANNING MULTIFREQUENCY MICROWAVE RADIOMETER, AND INFRARED RADIOMETER. SOME OF THE ACCURACIES EXPECTED WERE DISTANCE BETWEEN SPACECRAFT AND OCEAN SURFACE TO 10 CM, WIND SPEEDS TO 2 M/S, AND SURFACE TEMPERATURES TO 1 DEG C.

----- SEASAT 1, MARSH-----

INVESTIGATION NAME- LASER TRACKING

NSSDC ID- 78-064A-06 INVESTIGATIVE PROGRAM
CODE ER
INVESTIGATION DISCIPLINE(S)
NAVIGATION
GEODESY

PERSONNEL
PI - J.G. MARSH NASA-GSFC

BRIEF DESCRIPTION
LASER CORNER REFLECTORS COMPOSED OF 96 FUSED SILICA 3.75-CM HEXAGONAL CORNER CUBE RETROREFLECTORS AND GROUND-BASED LASER SYSTEMS WERE USED TO OBTAIN PRECISE SATELLITE TRACKING INFORMATION. THE RETROREFLECTOR ARRAY WAS CONFIGURED AS A SINGLE RING OF CUBE CORNERS 1.27 M IN DIAMETER. SIXTEEN OF THE CUBE CORNERS WERE TILTED AWAY FROM THE AXIS OF THE RING BY AN ANGLE OF 25 DEG AND THE REMAINING 80 CUBES BY AN ANGLE OF 50 DEG. BECAUSE OF THE GREAT DISTANCE OF THE ARRAY FROM THE CENTER OF MASS OF THE SATELLITE THE RANGE CORRECTION VARIED FROM -5.28 M AT ZENITH TO -3.08 M NEAR THE HORIZON. WHEN ILLUMINATED BY LASER LIGHT PULSES FROM THE GROUND, EACH RETROREFLECTOR CUBE IN THE ARRAY REFLECTED THE LIGHT PULSES BACK TO A TELESCOPE/RECEIVER ON THE GROUND. A DIGITAL COUNTER RECORDED THE TIME OF FLIGHT OF THE LASER LIGHT PULSES FROM THE GROUND TO THE SATELLITE AND BACK TO THE GROUND. RANGE WAS DETERMINED FROM THIS TIME. NASA, USAF, SAO AND FOREIGN LASER TRACKING STATIONS TRACKED THIS SATELLITE.

----- SEASAT 1, MCLAIN-----

INVESTIGATION NAME- SCANNING VISUAL/INFRARED RADIOMETER

NSSDC ID- 78-064A-04 INVESTIGATIVE PROGRAM
CODE EB
INVESTIGATION DISCIPLINE(S)
METEOROLOGY
OCEANOGRAPHY

PERSONNEL
TL - E.P. MCLAIN NOAA-NESS
TM - R. BERNSTEIN SCRIPPS INST OCEANOGR
TM - O.K. HUH LOUISIANA STATE U
TM - W.L. BARNES NASA-GSFC
TM - F.M. VUKOVICH RESEARCH TRIANGLE INST
TM - K.D. FELLERMAN NASA-GSFC

BRIEF DESCRIPTION
THE SCANNING VISIBLE-IR RADIOMETER (SR) EXPERIMENT (1) OBTAINED IMAGES OF VISIBLE AND THERMAL IR EMISSION FROM OCEAN, COASTAL, AND ATMOSPHERIC FEATURES IN SUPPORT OF THE OTHER EXPERIMENTS AND (2) IDENTIFIED CURRENTS AND STORMS. THIS SENSOR, ORIGINALLY FLOWN ON THE ITOS SERIES SPACECRAFT, CONSISTED OF TWO SCANNING RADIOMETERS, A DUAL SR PROCESSOR AND TWO SR RECORDERS. THE RADIOMETER MEASURED REFLECTED RADIATION FROM THE EARTH/ATMOSPHERE SYSTEM IN THE 0.52- AND

0.73-MICROMETER BAND DURING THE DAY AND EMITTED RADIATION FROM THE EARTH AND ITS ATMOSPHERE IN THE 10.5- TO 12.5-MICROMETER REGION DURING THE DAY AND NIGHT.

----- SEASAT 1, PIERSON-----

INVESTIGATION NAME- MICROWAVE WIND SCATTEROMETER

NSSDC ID- 78-064A-03 INVESTIGATIVE PROGRAM
CODE EB
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
TL - W.J. PIERSON CUNY INST MAR+ATMOS SC
TM - W.L. GRANTHAM NASA-LARC
TM - G. FLITNER NOAA-NWS
TM - L. BAER OCEAN + ATMOSP SERVICE
TM - I.M. HALBERSTAM NASA-JPL
TM - W.L. JONES, JR. NASA-LARC
TM - D. MOORE U OF KANSAS

BRIEF DESCRIPTION
THE MICROWAVE WIND SCATTEROMETER EXPERIMENT WAS DESIGNED TO USE AN ACTIVE RADAR SYSTEM TO MEASURE WIND SPEED AND DIRECTION. THE INSTRUMENT, DEVELOPED FROM THE SKYLAB EXPERIMENTAL SCATTEROMETER, DETERMINED WIND DIRECTION WITHIN 20 DEG AND WIND SPEED FROM LESS THAN 4 METERS/S TO GREATER THAN 26 METERS/S WITH AN ACCURACY OF 2 METERS/S. THE SCATTEROMETER TOOK MEASUREMENTS OVER TWO 460 KM-WIDE SWATHS EQUALLY DISPLACED ABOUT THE NADIR BY 235 KM. A HIGH WIND SWATH ADDS AN ADDITIONAL 260 KM TO EACH SIDE.

----- SEASAT 1, ROSS-----

INVESTIGATION NAME- SCANNING MULTICHANNEL MICROWAVE RADIOMETER (SMR)

NSSDC ID- 78-064A-05 INVESTIGATIVE PROGRAM
CODE EB
INVESTIGATION DISCIPLINE(S)
OCEANOGRAPHY
METEOROLOGY

PERSONNEL
TL - D.B. ROSS NOAA-ERL
TM - J.W. SHERMAN, III NOAA-NESS
TM - F.T. BARATH NASA-JPL
TM - J. WATERS NASA-JPL
TM - J.P. HOLLINGER US NAVAL RESEARCH LAB
TM - T.T. WILHEIT, JR. NASA-GSFC
TM - N. HUANG NASA-WFC
TM - C.T. SWIFT NASA-LARC
TM - W.J. CAMPBELL US GEOLOGICAL SURVEY
TM - V.J. CARDONE OCEAN WEATHER INC

BRIEF DESCRIPTION
THE PRIMARY PURPOSE OF THE SCANNING MULTICHANNEL MICROWAVE RADIOMETER EXPERIMENT WAS TO OBTAIN AND USE OCEAN MOMENTUM AND ENERGY-TRANSFER PARAMETERS ON A NEARLY ALL-WEATHER OPERATIONAL BASIS. WINDS, WATER VAPOR, LIQUID WATER CONTENT, AND MEAN CLOUD DROPLET SIZE, ALL AT LOW ALTITUDES, WERE PARAMETERS WHICH WERE DERIVED. OCEAN ICE VS WATER WAS ALSO DETERMINED. MICROWAVE BRIGHTNESS TEMPERATURES WERE OBSERVED WITH A 10-CHANNEL (FIVE-FREQUENCY DUAL POLARIZED) SCANNING RADIOMETER OPERATION AT 0.8-, 1.4-, 1.7-, 2.8-, AND 4.6-CM WAVELENGTHS (37, 21, 18, 10.69, AND 6.633 GHZ). THE ANTENNA WAS A PARABOLIC REFLECTOR OFFSET FROM NADIR BY 0.73 RAD. MOTION OF THE ANTENNA REFLECTOR PROVIDED OBSERVATIONS FROM WITHIN CONICAL VOLUME ALONG THE GROUND TRACK OF THE SPACECRAFT. THIS SAME EXPERIMENT WAS ON NIMBUS 7.

----- SEASAT 1, TAPLEY-----

INVESTIGATION NAME- COMPRESSED PULSE RADAR ALTIMETER (RA)

NSSDC ID- 78-064A-01 INVESTIGATIVE PROGRAM
CODE EB
INVESTIGATION DISCIPLINE(S)
NAVIGATION
METEOROLOGY

PERSONNEL
TL - B.D. TAPLEY U OF TEXAS, AUSTIN
TM - S.L. SMITH, III USN SURFACE WEAPNS CTR
TM - B.H. CHOVIKZ NOAA-NOS
TM - W.F. TOWNSEND NASA-WFC
TM - J.T. MCGOOGAN NASA-WFC
TM - H.M. BYRNE NOAA-PMEL
TM - E.M. GAPOSCHKIN SAO
TM - P. DELEONIBUS US NAVAL RESEARCH LAB
TM - B. YAPLEE US NAVAL RESEARCH LAB
TM - C.J. COHEN USN SURFACE WEAPNS CTR

ORIGINAL PAGE IS
OF POOR QUALITY

BRIEF DESCRIPTION

THE COMPRESSED PULSE RADAR ALTIMETER EXPERIMENT (1) MEASURED THE ALTITUDE BETWEEN THE SPACECRAFT AND THE OCEAN SURFACE AND (2) MEASURED WAVE HEIGHT. THE ALTIMETER WAS A MORE ACCURATE VERSION OF THE SKYLAB RADAR ALTIMETER, EXPERIMENT S-193 (NSSDC 73-027A-20), AND WAS SIMILAR TO THE ALTIMETER THAT FLEW ON GEOS 3. THE ALTIMETER PRECISION OF PLUS OR MINUS 10 CM ALLOWED TIME VARYING FEATURES SUCH AS TIDES, WIND PILE-UP, AND STORM SURGES TO BE SENSED AND IDENTIFIED. IT WAS ALSO CAPABLE OF LOCATING AND MAPPING OCEAN SURFACE CURRENTS WITH SPEEDS OF 30 TO 50 CM/S OR GREATER, BECAUSE THE SLOPE OF THE SURFACE WAS PROPORTIONAL TO THE SURFACE SPEED. THE MEASUREMENT OF WAVE HEIGHT, WHICH WAS REQUIRED TO OBTAIN A 10-CM PRECISION IN ALTITUDE, COULD BE COMBINED WITH SURFACE WIND MEASUREMENTS TO DETERMINE SEA STATE.

----- SEASAT 1, TELEKI-----

INVESTIGATION NAME- COHERENT SYNTHETIC APERTURE IMAGING RADAR (SAR)

NSSDC ID- 78-064A-02

INVESTIGATIVE PROGRAM
CODE EBINVESTIGATION DISCIPLINE(S)
NAVIGATION
METEOROLOGY

PERSONNEL

TL - P.G. TELEKI	US GEOLOGICAL SURVEY
TM - D.B. ROSS	NOAA-ERL
TM - W.J. CAMPBELL	US GEOLOGICAL SURVEY
TM - A. LOOMIS	NASA-JPL
TM - W.E. BROWN, JR.	NASA-JPL
TM - F.T. BARATH	NASA-JPL
TM - D.H. RODGERS	NASA-JPL
TM - C.L. RUFENACH	NOAA-ERL
TM - J.W. SHERMAN, III	NOAA-NESS
TM - R. STEWART	SCRIPPS INST OCEANOGR
TM - J. ZELENKA	ENVIRON RES INST OF MI
TM - O.H. SHEMPIN	NASA-JPL

BRIEF DESCRIPTION

THE COHERENT, SYNTHETIC APERTURE, IMAGING RADAR EXPERIMENT WAS DESIGNED TO USE WAVE PATTERN AND DYNAMIC BEHAVIOR INFORMATION TO OBTAIN IMAGES OF THE OCEAN. THE INSTRUMENT, FLOWN ON APOLLO 17 AS THE APOLLO LUNAR SOUNDER, YIELDED IMAGES OF WAVES WHOSE WAVE LENGTH WAS IN THE RANGE OF 50 TO 1000 METERS AND COULD DETERMINE WAVE DIRECTION WITHIN 20 DEG WITH THE POSSIBILITY OF A 180-DEG AMBIGUITY FOR ONE-SIDE IMAGES. WAVE HEIGHT COULD ALSO BE DETERMINED FROM THE DATA FOR FULLY DEVELOPED SEAS. THE IMAGING RADAR COULD FUNCTION THROUGH CLOUDS AND NOMINAL RAIN TO PROVIDE WAVE PATTERNS NEAR SHORELINE AND HIGH-RESOLUTION PICTURES OF ICE, OIL SPILLS, CURRENT PATTERNS, AND SIMILAR FEATURES.

***** SIGNE 3*****

SPACECRAFT COMMON NAME- SIGNE 3

ALTERNATE NAMES- SOL INTER GAMMA NEUT EXP

NSSDC ID- 77-049A

LAUNCH DATE- 06/17/77

WEIGHT- 102. KG

LAUNCH SITE- UNKNOWN, U.S.S.R.
LAUNCH VEHICLE- UNKNOWN

SPONSORING COUNTRY/AGENCY

FRANCE CNES
U.S.S.R. INTERCOS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC	EPOCH DATE- 06/19/77
ORBIT PERIOD- 94.395 MIN	INCLINATION- 50.67 DEG
PERIAPSIS- 457.33 KM ALT	APOAPSIS- 522.54 KM ALT

PERSONNEL

PM - A. MIZZI	CNES
PM - KREMNEV	SAS-IPA
PS - M. NIEL	CESR
PS - G.O. THUILLIER	CNRS

BRIEF DESCRIPTION

SIGNE 3 WAS A FRENCH SATELLITE PLACED IN ORBIT BY THE SOVIET UNION UNDER A COOPERATIVE AGREEMENT. THIS SATELLITE WAS PART OF THE D2 SERIES. IT CARRIED TWO SCIENTIFIC EXPERIMENTS, ONE FOR GAMMA-RAY ASTRONOMY IN THE ENERGY RANGE 20 KEV TO 10 MEV, AND ONE FOR CONTINUOUS MONITORING OF THE SOLAR SPECTRUM IN TWO ULTRAVIOLET BANDS (1800 TO 1950 A AND 2050 TO 2200 A). THE MAIN BODY OF THE SPACECRAFT WAS A CYLINDER 70 CM IN DIAMETER AND 81 CM IN HEIGHT. ELECTRICAL POWER WAS SUPPLIED BY FOUR SOLAR PANELS EXTENDING 1.3 M FROM THE SPACECRAFT AXIS. THE SOLAR ARRAY PROVIDED 50 W TO SILVER CADMIUM STORAGE BATTERIES. THE TELEMETRY EQUIPMENT CONSISTED OF A PCM-PM SYSTEM, USING A 136.7-MHZ, 0.5-W TRANSMITTER. REAL-TIME DATA RATE WAS 256 BPS. AN ONBOARD TAPE RECORDER EXTENDED THE DATA COVERAGE UNTIL ITS FAILURE IN MARCH 1978. THE COMMAND SYSTEM OPERATED AT 148.5 MHZ AND PROVIDED 54 SEPARATE COMMANDS. THE TELEMETRY NETWORK INCLUDED THREE FRENCH STATIONS (TOULOUSE, PRETORIA, AND KOUROU) AND FIVE NASA STATIONS (ASCENSION IS., SANTIAGO, QUITO, ORRORAL, AND MERRIT IS). THE SATELLITE CONTROL CENTER WAS AT TOULOUSE. THE SATELLITE AXIS WAS POINTED TOWARDS THE SUN AT A 10-DEG ANGLE WITH RESPECT TO THE SUN/EARTH LINE. NITROGEN GAS

JETS WERE USED TO MAINTAIN THIS ORIENTATION.

----- SIGNE 3, NIEL-----

INVESTIGATION NAME- GAMMA-RAY ASTRONOMY

NSSDC ID- 77-049A-01

INVESTIGATIVE PROGRAM
SCIENCEINVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL

PI - M. NIEL CESR

BRIEF DESCRIPTION

THE PURPOSE OF THE GAMMA-RAY ASTRONOMY (GRA) INVESTIGATION WAS TO SURVEY THE GAMMA RADIATION IN OUR GALAXY. THE DATA WERE USED TO INVESTIGATE THE CONCENTRATION OF INTERSTELLAR MATTER IN THE ARMS AND BETWEEN THE ARMS OF THE GALACTIC SPIRAL, TO LOCATE SOURCES OF INTENSE GAMMA-RAY RADIATION, TO STUDY THE ENERGY SPECTRUM OF THE GAMMA-RAY BACKGROUND, AND TO STUDY GAMMA-RAY BURSTS. THE EXPERIMENT INCLUDED A DIRECTIONAL PACKAGE CONTAINING SEVERAL SCINTILLATION DETECTORS WITH ASSOCIATED PHOTOMULTIPLIERS AND PREAMPLIFIERS. THE GAMMA-RAY TELESCOPE WAS MOUNTED IN THE CENTRAL TUBE OF THE SPACECRAFT AND WAS AIMED IN THE ANTI-SOLAR DIRECTION. THE TELESCOPE HAD A 20-DEG VIEWING ANGLE AND IT COULD SEE PLUS OR MINUS 20 DEG ABOUT THE ECLIPTIC PLANE. A COMPLETE GALACTIC SURVEY, WHICH INCLUDED OBSERVATIONS OF BOTH THE GALACTIC CENTER AND THE GALACTIC ANTI-CENTER, WAS ACCOMPLISHED IN 1 YR. THE INSTRUMENTATION YIELDED THE ENERGY SPECTRUM IN THE 20-KEV TO 8-MEV RANGE IN 14 BROAD BANDS AT A 16-S CYCLING RATE. THE ENERGY SPECTRUM IN THE 250-KEV TO 2.5-MEV RANGE WAS ALSO MONITORED IN 256 NARROW (10 KEV) CHANNELS WITH EACH IMPULSE BEING TRANSMITTED IN REAL TIME. ONE COUNTING CHANNEL (ASSOCIATED WITH OMNIDIRECTIONAL DETECTORS) MEASURED ENERGY BURSTS GREATER THAN 60 KEV WITH A PRECISION OF 8 MILLISECONDS. ONE COUNTING CHANNEL (ASSOCIATED WITH DIRECTIONAL DETECTORS) MEASURED ENERGY BURSTS GREATER THAN 20 KEV WITH A PRECISION OF 32 MS.

***** SMS 1*****

SPACECRAFT COMMON NAME- SMS 1

ALTERNATE NAMES- SMS-A, SYNCH METEOROL SATELL A
AEROS, ME01

NSSDC ID- 74-033A

LAUNCH DATE- 05/17/74

WEIGHT- 227. KG

LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY

UNITED STATES NOAA-NESS
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC	EPOCH DATE- 05/23/74
ORBIT PERIOD- 1340.4 MIN	INCLINATION- 1.9 DEG
PERIAPSIS- 32345.0 KM ALT	APOAPSIS- 35439.0 KM ALT

PERSONNEL

PM - A. BUTERA NOAA-NESS
PS - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION

THE SMS-1 WAS A NASA-DEVELOPED, NOAA-OPERATED SPACECRAFT. THE SPIN-STABILIZED, EARTH-SYNCHRONOUS SPACECRAFT CARRIED (1) A VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR) WHICH PROVIDED HIGH-QUALITY DAY/NIGHT CLOUDCOVER DATA AND MADE RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, (2) A METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM WHICH RELAYED PROCESSED DATA FROM CENTRAL WEATHER FACILITIES TO SMALL APT-EQUIPPED REGIONAL STATIONS AND COLLECTED AND RETRANSMITTED DATA FROM REMOTELY LOCATED EARTH-BASED PLATFORMS, AND (3) A SPACE ENVIRONMENTAL MONITOR (SEM) WHICH MEASURED PROTON, ELECTRON, AND SOLAR X-RAY FLUXES AND MAGNETIC FIELDS. THE CYLINDRICALLY SHAPED SPACECRAFT MEASURED 190.5 CM IN DIAMETER AND 230 CM IN LENGTH, EXCLUSIVE OF A MAGNETOMETER THAT EXTENDED AN ADDITIONAL 83 CM BEYOND THE CYLINDER SHELL. THE PRIMARY STRUCTURAL MEMBERS WERE A HONEYCOMBED EQUIPMENT SHELF AND A THRUST TUBE. THE VISSR TELESCOPE WAS MOUNTED ON THE EQUIPMENT SHELF AND VIEWED THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDED RADIALLY OUT FROM THE THRUST TUBE AND WAS AFFIXED TO THE SOLAR PANELS, WHICH FORMED THE OUTER WALLS OF THE SPACECRAFT AND PROVIDED THE PRIMARY SOURCE OF ELECTRICAL POWER. LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE THRUST TUBE AND THE SOLAR PANELS WERE STATION KEEPING AND DYNAMICS CONTROL EQUIPMENT, BATTERIES, AND MOST OF THE SEM EQUIPMENT. PROPER SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) WERE MAINTAINED BY TWO SEPARATE SETS OF JET THRUSTERS MOUNTED AROUND THE SPACECRAFT'S EQUATOR AND ACTIVATED BY GROUND COMMAND. THE SPACECRAFT USED BOTH UHF AND S-BAND FREQUENCIES IN ITS TELEMETRY AND COMMAND SUBSYSTEM. A LOW-POWER VHF TRANSPONDER PROVIDED TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVED AS A BACKUP FOR THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT HAD ATTAINED SYNCHRONOUS ORBIT.

----- SMS 1, NESS STAFF-----

INVESTIGATION NAME- VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR)

NSSDC ID- 74-033A-01 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF
OI - W.E. SHENK NOAA-NESS
NASA-GSFC

BRIEF DESCRIPTION

THE VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR) FLOWN ON SMS 1 PROVIDED DAY/NIGHT OBSERVATIONS OF CLOUDCOVER AND EARTH/CLOUD RADIANCE TEMPERATURE MEASUREMENTS FROM A SYNCHRONOUS, SPIN-STABILIZED, GEOSTATIONARY SATELLITE FOR USE IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE TWO-CHANNEL INSTRUMENT WAS ABLE TO TAKE BOTH FULL AND PARTIAL PICTURES OF THE EARTH'S DISK. THE INFRARED CHANNEL (10.5 TO 12.6 MICROMETER) AND THE VISIBLE CHANNEL (0.55 TO 0.70 MICROMETER) USED A COMMON OPTICS SYSTEM. INCOMING RADIATION WAS RECEIVED BY AN ELLIPTICALLY-SHAPED SCAN MIRROR AND COLLECTED BY A RITCHIEY-CRÉTIEN OPTICAL SYSTEM. THE SCAN MIRROR WAS SET AT A NOMINAL ANGLE OF 45 DEG TO THE VISSR OPTICAL AXIS, WHICH WAS ALIGNED PARALLEL TO THE SPIN AXIS OF THE SPACECRAFT. THE SPINNING MOTION OF THE SPACECRAFT (APPROXIMATELY 100 RPM) PROVIDED A WEST-TO-EAST SCAN MOTION WHEN THE SPIN AXIS OF THE SPACECRAFT WAS ORIENTED PARALLEL WITH THE EARTH'S AXIS. THE LATITUDINAL SCAN WAS ACCOMPLISHED BY SEQUENTIALLY TILTING THE SCANNING MIRROR NORTH TO SOUTH AT THE COMPLETION OF EACH SPIN. A FULL PICTURE TOOK 18.2 MIN TO COMPLETE AND ABOUT 2 MIN TO RETRACE. DURING EACH SCAN, THE FIELD OF VIEW ON THE EARTH WAS SWEEPED BY A LINEAR ARRAY OF EIGHT VISIBLE-SPECTRUM DETECTORS, EACH WITH A GROUND RESOLUTION OF 0.9 KM AT ZERO NADIR ANGLE. A MERCURY-CADMIUM TELLURIDE DETECTOR SENSED THE INFRARED PORTION OF THE SPECTRUM WITH A HORIZONTAL RESOLUTION OF APPROXIMATELY 8 KM AT ZERO NADIR ANGLE. THE INFRARED PORTION OF THE DETECTOR MEASURED RADIANCE TEMPERATURES BETWEEN 180 AND 315 K WITH A PROPOSED SENSITIVITY BETWEEN 0.4 AND 1.4 K. THE VISSR OUTPUT WAS DIGITIZED AND TRANSMITTED TO THE NATIONAL OCEANOGRAPHIC AND ATMOSPHERIC ADMINISTRATION (NOAA) COMMAND DATA ACQUISITION STATION (CDA), WALLOPS ISLAND, VA. THERE THE SIGNAL WAS FED INTO A 'LINE STRETCHER' WHERE IT WAS STORED AND TIME-STRETCHED FOR TRANSMISSION BACK TO THE SATELLITE AT REDUCED BANDWIDTH FOR RE-BROADCAST TO DATA UTILIZATION STATIONS (DUS). THE VISSR DATA, AS WITH ALL OPERATIONAL TYPE DATA, WERE HANDLED BY NOAA AND THE MAJORITY OF DATA WERE ARCHIVED BY THE ENVIRONMENTAL DATA SERVICE, SATELLITE DATA SERVICE BRANCH, SUITLAND, MD. LIMITED AMOUNTS OF RESEARCH-ORIENTED DATA WERE COLLECTED BY NASA AND WERE MAINTAINED AT NSSDC.

----- SMS 1, NESS STAFF-----

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM

NSSDC ID- 74-033A-05 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF
NOAA-NESS

BRIEF DESCRIPTION

THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM WAS AN EXPERIMENTAL COMMUNICATIONS AND DATA HANDLING SYSTEM DESIGNED TO RECEIVE AND PROCESS METEOROLOGICAL DATA COLLECTED FROM REMOTELY LOCATED EARTH-BASED DATA COLLECTION (OBSERVATION) PLATFORMS (DCP). THE COLLECTED DATA WERE RETRANSMITTED FROM THE SATELLITE TO SMALL, GROUND-BASED, REGIONAL DATA UTILIZATION CENTERS. DATA FROM UP TO 10,000 DCP STATIONS COULD BE HANDLED BY THE SYSTEM. THE SYSTEM ALSO ALLOWED FOR THE RETRANSMISSION OF NARROW-BAND (WEFAX TYPE) DATA TO EXISTING SMALL GROUND-BASED APT RECEIVING STATIONS FROM A LARGER WEATHER CENTRAL FACILITY. THIS COMMUNICATIONS SYSTEM OPERATED ON S-BAND FREQUENCIES. THE MINIMUM DATA COLLECTION SYSTEM FOR ONE SMS CONSISTED OF APPROXIMATELY 3500 DCP STATIONS TO BE CONTACTED IN A 6-H PERIOD. THE TOTAL AMOUNT OF DATA COLLECTED DURING THE 6-H PERIOD WAS BETWEEN 350K AND 600K BITS, DEPENDING ON THE CODING TECHNIQUES. DATA RECEIVED FROM INDIVIDUAL STATIONS VARIED FROM 50 TO 3000 BITS, DEPENDING ON THE TYPE AND VARIETY OF SENSORS USED AT AN INDIVIDUAL DCP STATION.

----- SMS 1, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR

NSSDC ID- 74-033A-02 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS
OI - H.H. SAUER

NOAA-ERL
NOAA-ERL

BRIEF DESCRIPTION

A NUMBER OF SEPARATE SILICON SOLID-STATE DETECTORS, EACH WITH A TAILORED MODERATOR THICKNESS AND A SEPARATE ELECTRONICS UNIT FOR PULSE AMPLIFICATION AND PULSE HEIGHT DISCRIMINATION, WERE USED TO OBTAIN THE FOLLOWING PARTICLE TYPE/ENERGY MEASUREMENTS -- SEVEN CHANNELS MEASURED PROTONS IN THE RANGE 1 TO 500 MEV, SIX CHANNELS MEASURED ALPHA PARTICLES IN THE RANGE 4 TO 400 MEV, AND ONE CHANNEL MEASURED ELECTRONS GREATER THAN 0.5 MEV.

----- SMS 1, WILLIAMS-----

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSSDC ID- 74-033A-03 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - D.J. WILLIAMS
OI - R.F. DONNELLY

NOAA-ERL
NOAA-ERL

BRIEF DESCRIPTION

THE X-RAY COUNTER WAS COMPOSED OF A COLLIMATOR, TWO IONIZATION CHAMBERS, AND TWO ELECTROMETERS. A SMALL ANGULAR APERTURE HAS BEEN CHOSEN FOR THE TELESCOPE COLLIMATOR, WHICH WAS MOUNTED SO THAT THE DECLINATION OF ITS AXIS CAN BE CONTROLLED BY GROUND COMMAND TO INSURE THAT THE SUN IS VIEWED BY THE TELESCOPE ONCE DURING EVERY VEHICLE ROTATION. ONE ION CHAMBER WAS FILLED WITH ARGON AT 1 ATM FOR DETECTION OF 1- TO 8-A X RAYS, AND HAD A 1.27-E-4M BERYLLIUM WINDOW TO EXCLUDE X RAYS OF LONGER WAVELENGTHS. THE OTHER CHAMBER WAS FILLED WITH XENON AT 1.5 TO 2 ATM AND HAD A 1.27-E-3M BERYLLIUM WINDOW FOR MEASUREMENTS OF X RAYS IN THE WAVELENGTH RANGE 0.5- TO 3-A.

----- SMS 1, WILLIAMS-----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- 74-033A-04 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - D.J. WILLIAMS
OI - J.N. BARFIELD

NOAA-ERL
NOAA-ERL

BRIEF DESCRIPTION

A BIAXIAL, SHORT BOOM-MOUNTED (2 FT) CLOSED-LOOP, FLUXGATE MAGNETOMETER WAS ORIENTED WITH ONE AXIS ALONG THE S/C SPIN AXIS, AND ONE IN THE SPIN PLANE. EACH SENSOR HAD A SELECTABLE RANGE (+50, 100, 200, OR 400 NT), AN OFFSET FIELD CAPABILITY (PLUS OR MINUS 1200 NT IN 40-NT STEPS), AND AN IN-FLIGHT CALIBRATION CAPABILITY.

***** SMS 2*****

SPACECRAFT COMMON NAME- SMS 2
ALTERNATE NAMES- PL-731E, SYNCH METEOROL SATELL B
SMS-B, ME02

NSSDC ID- 75-011A

LAUNCH DATE- 02/06/75 WEIGHT- 243. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 04/01/75
ORBIT PERIOD- 1436.2 MIN INCLINATION- 1.0 DEG
PERIAPSIS- 35778. KM ALT APOAPSIS- 35799. KM ALT

PERSONNEL
PM - A. BUTERA NOAA-NESS
PS - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION

THE SMS 2, A NASA-DEVELOPED, NOAA-OPERATED SPACECRAFT, CARRIED (1) A VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR) TO PROVIDE HIGH-QUALITY DAY/NIGHT CLOUDCOVER DATA AND TO TAKE RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, (2) A METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM TO RELAY PROCESSED DATA FROM CENTRAL WEATHER FACILITIES TO SMALL APT-EQUIPPED REGIONAL STATIONS AND TO COLLECT AND RETRANSMIT DATA FROM REMOTE EARTH-BASED PLATFORMS, AND (3) A SPACE ENVIRONMENT MONITOR (SEM) SYSTEM TO MEASURE PROTON, ELECTRON, AND SOLAR X-RAY FLUXES AND MAGNETIC FIELDS. THE SPIN-STABILIZED, EARTH-SYNCHRONOUS, AND CYLINDRICALLY SHAPED SPACECRAFT MEASURED 190.5 CM IN DIAM AND 230 CM IN LENGTH, EXCLUSIVE OF A MAGNETOMETER THAT EXTENDED AN ADDITIONAL 83 CM

BEYOND THE CYLINDER SHELL. THE PRIMARY STRUCTURAL MEMBERS WERE A HONEYCOMB EQUIPMENT SHELF AND A THRUST TUBE. THE VISSR TELESCOPE WAS MOUNTED ON THE EQUIPMENT SHELF AND VIEWED THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDED RADially OUT FROM THE THRUST TUBE AND WAS AFFIXED TO THE SOLAR PANELS, WHICH FORMED THE OUTER WALLS OF THE SPACECRAFT. LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE THRUST TUBE AND THE SOLAR PANELS WERE STATIONKEEPING AND DYNAMICS CONTROL EQUIPMENT, BATTERIES, AND MOST OF THE SEM EQUIPMENT. PROPER SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) WAS MAINTAINED BY TWO SEPARATE SETS OF JET THRUSTERS MOUNTED AROUND THE SPACECRAFT'S EQUATOR AND ACTIVATED BY GROUND COMMAND. BOTH UHF-BAND AND S-BAND FREQUENCIES WERE USED IN THE TELEMETRY AND COMMAND SUBSYSTEMS. A LOW-POWER VHF TRANSPONDER PROVIDED TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVED AS A BACKUP FOR THE PRIMARY SUBSYSTEM AFTER THE SYNCHRONOUS ORBIT WAS ATTAINED.

----- SMS 2, NESS STAFF-----

INVESTIGATION NAME- VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR)

NSSDC ID- 75-011A-04 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - NESS STAFF NOAA-NESS
OI - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION

THE VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR) FLOWN ON SMS 2 PROVIDED DAY/NIGHT OBSERVATIONS OF CLOUDCOVER AND EARTH/CLOUD RADIANCE TEMPERATURE MEASUREMENTS FROM A SYNCHRONOUS, SPIN-STABILIZED, GEOSTATIONARY SATELLITE FOR USE IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE TWO-CHANNEL INSTRUMENT WAS ABLE TO TAKE BOTH FULL AND PARTIAL PICTURES OF THE EARTH'S DISK. THE INFRARED CHANNEL (10.5 TO 12.6 MICROMETERS) AND THE VISIBLE CHANNEL (0.55 TO 0.70 MICROMETER) USED A COMMON OPTICS SYSTEM. INCOMING RADIATION WAS RECEIVED BY AN ELLIPTICALLY-SHAPED SCAN MIRROR AND COLLECTED BY A RITCHEY-CHRETIEN OPTICAL SYSTEM. THE SCAN MIRROR WAS SET AT A NOMINAL ANGLE OF 45 DEG TO THE VISSR OPTICAL AXIS, WHICH WAS ALIGNED PARALLEL TO THE SPIN AXIS OF THE SPACECRAFT. THE SPINNING MOTION OF THE SPACECRAFT (APPROXIMATELY 100 RPM) PROVIDED A WEST-TO-EAST SCAN MOTION WHEN THE SPIN AXIS OF THE SPACECRAFT IS ORIENTED PARALLEL WITH THE EARTH'S AXIS. THE LATITUDINAL SCAN WAS ACCOMPLISHED BY SEQUENTIALLY TILTING THE SCANNING MIRROR NORTH TO SOUTH AT THE COMPLETION OF EACH SPIN. A FULL PICTURE TOOK 18.2 MIN TO COMPLETE AND ABOUT 2 MIN TO RETRACE. DURING EACH SCAN, THE FIELD OF VIEW ON THE EARTH WAS SWEEPED BY A LINEAR ARRAY OF EIGHT VISIBLE-SPECTRUM DETECTORS, EACH WITH A GROUND RESOLUTION OF 0.9 KM AT ZERO NAIR ANGLE. A MERCURY-CADMIUM TELLURIDE DETECTOR SENSED THE INFRARED PORTION OF THE SPECTRUM WITH A HORIZONTAL RESOLUTION OF APPROXIMATELY 8 KM AT ZERO NAIR ANGLE. THE INFRARED PORTION OF THE DETECTOR MEASURED RADIANCE TEMPERATURES BETWEEN 180 AND 315 K WITH A PROPOSED SENSITIVITY BETWEEN 0.4 AND 1.4 K. THE VISSR OUTPUT WAS DIGITIZED AND TRANSMITTED TO THE NATIONAL OCEANOGRAPHIC AND ATMOSPHERIC ADMINISTRATION (NOAA) COMMAND DATA ACQUISITION STATION (CDA), WOLLOPS ISLAND, VA. THERE THE SIGNAL WAS FED INTO A 'LINE STRETCHER' WHERE IT WAS STORED AND TIME-STRETCHED FOR TRANSMISSION BACK TO THE SATELLITE AT REDUCED BANDWIDTH FOR RE-BROADCAST TO DATA UTILIZATION STATIONS (DUS). THE VISSR DATA, AS WITH ALL OPERATIONAL TYPE DATA, WERE HANDLED BY NOAA AND THE MAJORITY OF DATA WERE ARCHIVED BY THE ENVIRONMENTAL DATA SERVICE, SATELLITE DATA SERVICE BRANCH, SUITLAND, MD. LIMITED AMOUNTS OF RESEARCH-ORIENTED DATA WERE COLLECTED BY NASA AND WERE MAINTAINED AT NSSDC.

----- SMS 2, NESS STAFF-----

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM

NSSDC ID- 75-011A-05 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL

PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM, AN EXPERIMENTAL COMMUNICATIONS AND DATA HANDLING SYSTEM OPERATING ON S-BAND FREQUENCIES, RECEIVED AND PROCESSED METEOROLOGICAL DATA COLLECTED FROM REMOTELY LOCATED EARTH-BASED DATA COLLECTION (OBSERVATION) PLATFORMS (DCP). THE COLLECTED DATA WAS RETRANSMITTED FROM THE SATELLITE TO SMALL, GROUND-BASED, REGIONAL DATA UTILIZATION CENTERS. DATA FROM UP TO 10,000 DCP STATIONS WERE HANDLED BY THE SYSTEM. THE SYSTEM ALSO ALLOWED FOR THE RETRANSMISSION OF NARROW-BAND (WEFAX TYPE) DATA TO EXISTING SMALL GROUND-BASED APT RECEIVING STATIONS FROM A LARGER WEATHER CENTRAL FACILITY. THE MINIMUM DATA COLLECTION FOR ONE SPACECRAFT CONSISTED OF APPROXIMATELY 3500 DCP STATIONS CONTACTED IN 6 H. THE TOTAL AMOUNT OF DATA COLLECTED DURING THE 6 H WAS BETWEEN 350K AND 600K BITS, DEPENDING ON THE CODING TECHNIQUES. DATA RECEIVED FROM INDIVIDUAL STATIONS VARIED FROM

50 TO 3000 BITS, DEPENDING ON THE TYPE AND VARIETY OF SENSORS USED AT THE DCP STATION.

----- SMS 2, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR

NSSDC ID- 75-011A-01 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS NOAA-ERL
OI - H.H. SAUER NOAA-ERL

BRIEF DESCRIPTION

A NUMBER OF SEPARATE SILICON SOLID-STATE DETECTORS, EACH WITH A TAILORED MODERATOR THICKNESS AND A SEPARATE ELECTRONICS UNIT FOR PULSE AMPLIFICATION AND PULSEHEIGHT DISCRIMINATION, ARE USED TO OBTAIN THE FOLLOWING PARTICLE TYPE AND ENERGY MEASUREMENTS -- SEVEN CHANNELS MEASURE PROTONS IN THE RANGE 1 TO 500 MEV, SIX CHANNELS MEASURE ALPHA PARTICLES IN THE RANGE 4 TO 400 MEV, AND ONE CHANNEL MEASURES ELECTRONS GREATER THAN 0.5 MEV.

----- SMS 2, WILLIAMS-----

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSSDC ID- 75-011A-02 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - D.J. WILLIAMS NOAA-ERL
OI - R.F. DONNELLY NOAA-ERL

BRIEF DESCRIPTION

THE X-RAY COUNTER WAS COMPRISED OF A COLLIMATOR, TWO IONIZATION CHAMBERS, AND TWO ELECTROMETERS. A SMALL ANGULAR APERTURE WAS CHOSEN FOR THE TELESCOPE COLLIMATOR. THE COLLIMATOR, MOUNTED SO ITS AXIS DECLINATION WAS CONTROLLED BY GROUND COMMAND, VIEWED THE SUN ONCE EVERY VEHICLE ROTATION. ONE ION CHAMBER, FILLED WITH ARGON AT 1 ATM, DETECTED 1- TO 8-A X RAYS, AND HAD A 1.27-E-4M BERYLLIUM WINDOW TO EXCLUDE X RAYS OF LONGER WAVELENGTHS. THE OTHER CHAMBER WAS FILLED WITH XENON AT 1.5 TO 2 ATM AND HAD A 1.27-E-3M BERYLLIUM WINDOW TO MEASURE X RAYS OF 0.5 TO 3 A.

----- SMS 2, WILLIAMS-----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- 75-011A-03 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS NOAA-ERL
OI - J.N. BARFIELD NOAA-ERL

BRIEF DESCRIPTION

A SHORT BOOM DEPLOYED .61 M BIAXIAL, CLOSED-LOOP, FLUXGATE MAGNETOMETER WITH ONE SENSOR ALIGNED PARALLEL TO THE SPACECRAFT SPIN AXIS AND THE OTHER PERPENDICULAR TO THIS AXIS MEASURED THE VECTOR MAGNETIC FIELD. SELECTABLE RANGE (+50, 100, 200, OR 400 NT), AN OFFSET FIELD CAPABILITY (PLUS OR MINUS 1200 NT IN 40-NT STEPS), AND AN INFILIGHT CALIBRATION CAPABILITY.

***** SOLRAD 11B*****

SPACECRAFT COMMON NAME- SOLRAD 11B
ALTERNATE NAMES- SOLRAD HI-TRIP, SESP P74-1D
SP74-1D, SESP NO. NRL-111-0264
SRD-11B

NSSDC ID- 76-023D

LAUNCH DATE- 03/15/76 WEIGHT- 102.15 KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-NAVY

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 07/01/76
ORBIT PERIOD- 7116.7 MIN INCLINATION- 25.6 DEG
PERIAPSIS- 115720. KM ALT APOAPSIS- 116645. KM ALT

PERSONNEL
PM - R.W. KREPLIN
PS - R.W. KREPLIN

US NAVAL RESEARCH LAB
US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

SOLRAD 11B WAS ONE OF A PAIR OF IDENTICAL SATELLITES THAT WERE PLACED IN A CIRCULAR EQUATORIAL ORBIT OF 20 EARTH RADII. THE SATELLITES, WHICH WERE ORIENTED TOWARDS THE SUN, PROVIDED 100 PERCENT REAL-TIME, CONTINUOUS MONITORING OF SOLAR X-RAY, UV, AND ENERGETIC PARTICLE EMISSIONS. EXPERIMENTS INCLUDED BROADBAND ION CHAMBERS OBSERVING SOLAR X RAYS BETWEEN 0.1 AND 60 A, PROPORTIONAL COUNTERS AND SCINTILLATORS OBSERVING SOLAR X RAYS BETWEEN 2 AND 150 KEV, AN EUV DETECTOR COVERING THREE BANDS BETWEEN 170 AND 1000 A, A VARIABLE RESOLUTION EBERT-FASTIE SPECTROMETER COVERING THE WAVELENGTH RANGE OF 1100 TO 1600 A (RESOLUTION -- 1 TO 25 A), A SOLAR WIND MONITOR, SOLAR PROTON, ELECTRON, AND ALPHA PARTICLE MONITORS, TWO X-RAY POLARIMETERS (ONE UTILIZING BRAGG SCATTERING AND THE OTHER UTILIZING THOMPSON SCATTERING), A BRAGG SPECTROMETER OBSERVING MAGNESIUM-11 AND -12 LINES, A LARGE-AREA AURORAL X-RAY DETECTOR, AND A PASSIVELY COOLED SOLID-STATE X-RAY DETECTOR TO MEASURE BACKGROUND X-RAY EMISSIONS.

----- SOLRAD 11B, KREPLIN-----

INVESTIGATION NAME- 1- TO 8-A SOLAR X-RAY MONITOR

NSSDC ID- 76-023D-04

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
X-RAY ASTRONOMY

PERSONNEL

PI - R.W. KREPLIN	US NAVAL RESEARCH LAB
OI - R.G. TAYLOR	US NAVAL RESEARCH LAB
OI - D.M. HORAN	US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF TWO COMPLETE SETS OF IONIZATION-CHAMBER AND ELECTROMETER-AMPLIFIER COMBINATIONS. THE IONIZATION CHAMBERS WERE SENSITIVE TO SOLAR X RAYS IN THE 1- TO 8-A RANGE. THE TWO SETS WERE DRIVEN BY SEPARATE POWER SUPPLIES, ALTHOUGH ONLY ONE SET WAS SELECTED FOR TELEMETRY TRANSMISSION. DATA WERE TRANSMITTED WITH A 15-S TIME RESOLUTION. THE ELECTROMETER-AMPLIFIERS WERE ABLE TO CHANGE RANGES AUTOMATICALLY OR MANUALLY. THE DETECTORS COULD NOT BE CALIBRATED IN FLIGHT, BUT THE ELECTROMETER-AMPLIFIERS COULD BE CALIBRATED ON EACH RANGE WITHOUT DETACHING THE DETECTOR.

----- SOLRAD 11B, KREPLIN-----

INVESTIGATION NAME- 8- TO 16-A SOLAR X-RAY MONITOR

NSSDC ID- 76-023D-05

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
SOLAR PHYSICS

PERSONNEL

PI - R.W. KREPLIN	US NAVAL RESEARCH LAB
OI - R.G. TAYLOR	US NAVAL RESEARCH LAB
OI - D.M. HORAN	US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF TWO COMPLETE SETS OF IONIZATION-CHAMBER AND ELECTROMETER-AMPLIFIER COMBINATIONS. THE IONIZATION CHAMBERS WERE SENSITIVE TO SOLAR X RAYS IN THE 8- TO 16-A RANGE. THE TWO SETS WERE DRIVEN BY SEPARATE POWER SUPPLIES, ALTHOUGH ONLY ONE SET WAS SELECTED FOR TELEMETRY TRANSMISSION. DATA WERE TRANSMITTED WITH A 30-S TIME RESOLUTION. THE ELECTROMETER-AMPLIFIERS WERE ABLE TO CHANGE RANGES AUTOMATICALLY OR MANUALLY. THE DETECTORS COULD NOT BE CALIBRATED IN FLIGHT, BUT THE ELECTROMETER-AMPLIFIERS COULD BE CALIBRATED ON EACH RANGE WITHOUT DETACHING THE DETECTOR.

----- SOLRAD 11B, KREPLIN-----

INVESTIGATION NAME- 44- TO 60-A SOLAR X-RAY MONITOR

NSSDC ID- 76-023D-06

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
X-RAY ASTRONOMY

PERSONNEL

PI - R.W. KREPLIN	US NAVAL RESEARCH LAB
OI - D.M. HORAN	US NAVAL RESEARCH LAB
OI - R.G. TAYLOR	US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF TWO COMPLETE SETS OF IONIZATION-CHAMBER AND ELECTROMETER-AMPLIFIER COMBINATIONS. THE IONIZATION CHAMBERS WERE SENSITIVE TO SOLAR X RAYS IN THE 44- TO 60-A RANGE. THE TWO SETS WERE DRIVEN BY SEPARATE POWER SUPPLIES, ALTHOUGH ONLY ONE SET WAS SELECTED FOR TELEMETRY TRANSMISSION. DATA WERE TRANSMITTED WITH A 30-S TIME RESOLUTION. THE ELECTROMETER-AMPLIFIERS WERE ABLE TO CHANGE CURRENT RANGES AUTOMATICALLY OR MANUALLY. THE

ELECTROMETER-AMPLIFIERS COULD BE CALIBRATED ON EACH RANGE WITHOUT DETACHING THE DETECTOR. THE DETECTORS COULD BE CALIBRATED IN FLIGHT BY COMMANDING A SHUTTER-MOUNTED RADIOACTIVE SOURCE INTO POSITION.-

----- SOLRAD 11B, KREPLIN-----

INVESTIGATION NAME- 170- TO 1050-A SOLAR EUV MONITOR

NSSDC ID- 76-023D-07

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - R.W. KREPLIN	US NAVAL RESEARCH LAB
OI - R.G. TAYLOR	US NAVAL RESEARCH LAB
OI - D.M. HORAN	US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF THREE SETS OF LITHIUM FLUORIDE PHOTSENSITIVE SURFACE DETECTORS COUPLED TO FOUR-RANGE ELECTROMETER-AMPLIFIERS. THE THREE SETS WERE NOT REDUNDANT DUE TO THE DIFFERENT FILTERS BEING USED. A BERYLLIUM FILTER LIMITED ONE DETECTOR'S RESPONSE TO WAVELENGTHS FROM 170 TO 500 A. A TIN FILTER LIMITED A SECOND DETECTOR'S RESPONSE TO WAVELENGTHS FROM 450 TO 850 A. AN INDIUM FILTER LIMITED THE THIRD DETECTOR'S RESPONSE TO WAVELENGTHS FROM 725 TO 1050 A. THE DETECTOR-ELECTROMETER SETS WERE DRIVEN BY SEPARATE POWER SUPPLIES. EACH DETECTOR WAS READ EVERY 7.5 S. THE ELECTROMETERS COULD BE CALIBRATED DURING FLIGHT WITHOUT DETACHING THE DETECTOR, ALTHOUGH THE DETECTORS COULD NOT BE CALIBRATED IN FLIGHT.

----- SOLRAD 11B, KREPLIN-----

INVESTIGATION NAME- 0.5- TO 3-A SOLAR X-RAY MONITOR

NSSDC ID- 76-023D-12

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
X-RAY ASTRONOMY

PERSONNEL

PI - R.W. KREPLIN	US NAVAL RESEARCH LAB
OI - R.G. TAYLOR	US NAVAL RESEARCH LAB
OI - D.M. HORAN	US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF THREE IONIZATION CHAMBERS CONNECTED IN PARALLEL TO A SINGLE ELECTROMETER-AMPLIFIER. THE IONIZATION CHAMBERS WERE SENSITIVE TO SOLAR X RAYS IN THE 0.5- TO 3.0-A RANGE. DATA WERE TRANSMITTED WITH A 15-S TIME RESOLUTION. THE ELECTROMETER-AMPLIFIER WAS ABLE TO CHANGE CURRENT RANGES AUTOMATICALLY OR MANUALLY. THE DETECTORS COULD NOT BE CALIBRATED IN FLIGHT, BUT THE ELECTROMETER-AMPLIFIER COULD BE CALIBRATED ON EACH RANGE WITHOUT DETACHING THE DETECTOR.

----- SOLRAD 11B, KREPLIN-----

INVESTIGATION NAME- 2- TO 10-A SOLAR X-RAY MONITOR

NSSDC ID- 76-023D-13

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
X-RAY ASTRONOMY

PERSONNEL

PI - R.W. KREPLIN	US NAVAL RESEARCH LAB
OI - R.G. TAYLOR	US NAVAL RESEARCH LAB
OI - D.M. HORAN	US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF AN IONIZATION CHAMBER AND ONE ELECTROMETER-AMPLIFIER. THE IONIZATION CHAMBER WAS SENSITIVE TO SOLAR X RAYS IN THE 1- TO 20-A RANGE. DATA WERE TRANSMITTED WITH A 30-S TIME RESOLUTION. THE ELECTROMETER-AMPLIFIER WAS ABLE TO CHANGE CURRENT RANGES AUTOMATICALLY OR MANUALLY. THE DETECTOR COULD NOT BE CALIBRATED IN FLIGHT, BUT THE ELECTROMETER-AMPLIFIER COULD BE CALIBRATED ON EACH RANGE WITHOUT DETACHING THE DETECTOR.

----- SOLRAD 11B, MEEKINS-----

INVESTIGATION NAME- CONTINUUM (8.8 A) AND MAGNESIUM LINE (9.17 A AND 8.42 A) MONITOR

NSSDC ID- 76-023D-03

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - J.F. MEEKINS US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
SOLAR X RAYS WERE OBSERVED IN THE MAGNESIUM-11 AND -12 LINES (9.17 A AND 8.42 A) AND IN THE CONTINUUM AT 8.8 A. THREE SHA CRYSTALS FIXED AT THREE DIFFERENT ANGLES ALLOWED SOLAR X RAYS TO UNDERGO FIRST-ORDER BRAGG REFLECTION INTO THREE PROPORTIONAL COUNTERS. IF THE SPACECRAFT SPIN AXIS HAD BECOME IMPROPERLY ORIENTED, THE SPECTROMETER WOULD HAVE FUNCTIONED PROPERLY IF THE ASPECT ANGLE HAD BEEN NO MORE THAN 1 DEG OFF NOMINAL, ALTHOUGH THE INSTRUMENT WOULD THEN HAVE FUNCTIONED AS A SCANNING SPECTROMETER WITH AN EXTREMELY SMALL SPECTRAL RANGE IN THE VICINITY OF THE TARGET WAVELENGTHS. DATA WERE ACCUMULATED OVER INTERVALS OF 1/64 OF A SPACECRAFT'S SPIN PERIOD, AND THE EXPERIMENT HAD A SAMPLING CYCLE OF APPROXIMATELY 1-MIN DURATION.

----- SOLRAD 118, YATES-----

INVESTIGATION NAME- LOW-ENERGY PROTON SPECTROMETER

NSSDC ID- 76-023D-21 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - K. YATES USAF GEOPHYS LAB
OI - R.W. KREPLIN US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
TWO TOTALLY DEPLETED SILICON SURFACE BARRIER DETECTORS, MOUNTED IN A SERIES, MEASURED PROTONS BETWEEN 150 KEV AND 6 MEV. PULSE HEIGHT ANALYSIS OF PULSES GENERATED IN THE FRONT DETECTOR, WHICH WERE UNACCOMPANIED BY PULSES IN THE REAR DETECTOR, SEPARATED THE PROTON COUNTS INTO 12 ENERGY CHANNELS. PERMANENT MAGNETS WERE USED TO DEFLECT INCIDENT ELECTRONS WITH ENERGIES LESS THAN 2 MEV. VERY LITTLE FLUX DIRECTIONALITY INFORMATION WAS OBTAINED.

***** STP P78-1*****

SPACECRAFT COMMON NAME- STP P78-1
ALTERNATE NAMES- SPACE TEST PROGRAM P78-1, P78-1
11278, SOLWIND
SOLWIND

NSSDC ID- 79-017A

LAUNCH DATE- 02/24/79 WEIGHT- 849.6 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 02/24/79
ORBIT PERIOD- 96.3 MIN INCLINATION- 97.9 DEG
PERIAPSIS- 560. KM ALT APOAPSIS- 600. KM ALT

PERSONNEL
PM - W. WALKER USAF-SAMSO
PS - J.R. STEVENS AEROSPACE CORP

BRIEF DESCRIPTION
THE SPACE TEST PROGRAM (STP) P78-1 MISSION WAS DESIGNED TO OBTAIN SCIENTIFIC DATA FROM EARTH AND SUN-ORIENTED EXPERIMENTS. THE SPACECRAFT WAS SUN-ORIENTED AND HAD ITS SPIN AXIS PERPENDICULAR TO THE ORBIT PLANE AND THE SATELLITE-SUN LINE. THE INSTRUMENTATION CONSISTED OF (1) A GAMMA-RAY SPECTROMETER AND PARTICLE DETECTORS, (2) A WHITE-LIGHT CORONAGRAPH AND AN EXTREME-ULTRAVIOLET (XUV) HELIOGRAPH, (3) SOLAR X-RAY SPECTROMETER AND SPECTROHELIOGRAPH, (4) AN EXTREME-ULTRAVIOLET (XUV) SPECTROMETER, (5) A HIGH-LATITUDE PARTICLE SPECTROMETER, (6) AN X-RAY MONITOR, AND (7) A PRELIMINARY AEROSOL MONITOR.

----- STP P78-1, BOWYER-----

INVESTIGATION NAME- EXTREME ULTRAVIOLET SPECTROMETER

NSSDC ID- 79-017A-04 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
UPPER ATMOSPHERE RESEARCH

PERSONNEL
PI - C.S. BOWYER U OF CALIF, BERKELEY

BRIEF DESCRIPTION
THIS INVESTIGATION USED AN EXTREME ULTRAVIOLET (XUV) SPECTROMETER TO MEASURE IONIZATION EFFECTS OF XUV RADIATION IN THE UPPER ATMOSPHERE.

----- STP P78-1, IMHOF-----

INVESTIGATION NAME- GAMMA RAY SPECTROMETER

NSSDC ID- 79-017A-01 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL
PI - W.L. IMHOF LOCKHEED PALO ALTO

BRIEF DESCRIPTION
THIS INVESTIGATION USED A GAMMA-RAY SPECTROMETER TO MEASURE THE DISTRIBUTION OF GAMMA-RAY SOURCES AND THE CHARACTERISTICS OF ENERGETIC PARTICLE FLUXES AT LOW ALTITUDES.

----- STP P78-1, KREPLIN-----

INVESTIGATION NAME- SOLAR X-RAY SPECTROMETER

NSSDC ID- 79-017A-03 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
SOLAR PHYSICS

PERSONNEL
PI - R.W. KREPLIN US NAVAL RESEARCH LAB
PI - P.B. LANDECKER AEROSPACE CORP

BRIEF DESCRIPTION
THIS INVESTIGATION USED AN X-RAY SPECTROMETER TO MONITOR SOLAR CORONAL X-RAYS FROM 0.30 TO 25 A. THE PURPOSE WAS TO USE THESE DATA IN DEVELOPING A MODEL OF SOLAR ACTIVITY WITH THE ABILITY TO PREDICT LEVELS OF ACTIVITY AND THE OCCURRENCES OF FLARES.

----- STP P78-1, MICHELS-----

INVESTIGATION NAME- SOLAR WIND MONITOR

NSSDC ID- 79-017A-02 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
SOLAR PHYSICS

PERSONNEL
PI - D.J. MICHELS US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
THIS INVESTIGATION USED A WHITE LIGHT CORONAGRAPH AND AN EXTREME ULTRAVIOLET HELIOGRAPH TO MONITOR THE SUN'S INNER AND OUTER CORONA. THE PURPOSE OF THE INVESTIGATION WAS TO DETERMINE THE CHARACTER OF THE PLASMA OUTFLOW AT THE SOURCE OF THE SOLAR WIND. THE INVESTIGATION ALSO MEASURED THE FORM AND STRUCTURE OF SOLAR FLARES, CORONAL HOLES, AND ALFVEN WAVES.

----- STP P78-1, PEPIN-----

INVESTIGATION NAME- PRELIMINARY AEROSOL MONITOR

NSSDC ID- 79-017A-07 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL
PI - T.J. PEPIN U OF WYOMING

BRIEF DESCRIPTION
THIS INVESTIGATION USES AN AEROSOL MONITORING INSTRUMENT TO MEASURE THE CONCENTRATION AND VERTICAL DISTRIBUTION OF AEROSOLS AND OZONE IN THE EARTH'S STRATOSPHERE.

----- STP P78-1, SHULMAN-----

INVESTIGATION NAME- X-RAY MONITOR

NSSDC ID- 79-017A-06 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - S.D. SHULMAN US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
THIS INVESTIGATION USED AN X-RAY MONITOR TO DETERMINE THE FREQUENCY AND LOCATION OF SHORT-LIVED X-RAY BURSTS FROM SPACE. IT PROVIDES A LOW RESOLUTION MAPPING CAPABILITY FOR AURORAL X-RAY EMISSION.

----- STP P78-1, VANCOUR-----

INVESTIGATION NAME- HIGH LATITUDE PARTICLE SPECTROMETER

INVESTIGATION NAME- HIGH LATITUDE PARTICLE SPECTROMETER

NSSDC ID- 79-017A-05

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
ATMOSPHERIC PHYSICS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - R.P. VANCOUR

USAF GEOPHYS LAB

BRIEF DESCRIPTION

THIS INVESTIGATION USED A HIGH-LATITUDE PARTICLE SPECTROMETER TO ACQUIRE ELECTRON DATA IN HIGH LATITUDE AURORAL ZONES, PRIMARILY DURING MAGNETIC STORM AND SUBSTORM PERIODS.

***** STP P78-2*****

SPACECRAFT COMMON NAME- STP P78-2

ALTERNATE NAMES- SESP P78-2A, P78-2
SCATHA, 11256

NSSDC ID- 79-007A

LAUNCH DATE- 01/30/79

WEIGHT- 343. KG

LAUNCH SITE- CAPE CANAVERAL, UNITED STATES

LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY

UNITED STATES

DOD-USAF

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC

ORBIT PERIOD- 794.8 MIN

PERIAPSIS- 184. KM ALT

EPOCH DATE- 02/01/79

INCLINATION- 27.4 DEG

APOAPSIS- 43905. KM ALT

PERSONNEL

PM - J.C. DURRETT

USAF-SAMSO

BRIEF DESCRIPTION

SPACECRAFT CHARGING AT HIGH ALTITUDES (SCATHA) WAS A SATELLITE PROGRAM FOR MEASURING THE CHARACTERISTICS OF THE PLASMASHEATH CHARGING PROCESS. THIS PROGRAM DETERMINED THE RESPONSE OF THE SATELLITE TO THIS CHARGING AND EVALUATED THE TECHNIQUES TO CORRECT THE PROBLEM. THE SPACECRAFT IS ESSENTIALLY A RIGHT CIRCULAR CYLINDER, 1.7 M IN DIAMETER AND 1.8 M HIGH. IT HAD A NEAR SYNCHRONOUS ORBIT AND SPUN ABOUT THE CYLINDER AXIS AT A RATE OF 1 RPM. THE SPIN VECTOR WAS NORMAL TO THE EARTH-SUN LINE AND IN THE EQUATORIAL PLANE OF THE EARTH. THERE WERE THREE 3-M BOOMS, A 2-M AND A 7-M BOOM ALL FOR DEPLOYMENT OF EXPERIMENTS. IN ADDITION THERE WAS A 100-M TIP-TO-TIP ELECTRIC FIELD ANTENNA. TELEMETRY CAPABILITY WAS BOTH PCM AND FM AND DATA COULD BE STORED UP TO 12 HOURS USING ON-BOARD TAPE RECORDERS. MISSION LIFE WAS ONE YEAR WITH POSSIBLE EXTENSION.

----- STP P78-2, AGGSON-----

INVESTIGATION NAME- ELECTRIC FIELD DETECTOR

NSSDC ID- 79-007A-05

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM/CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - T.L. AGGSON

NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT (SC10) MEASURED THE ABSOLUTE POTENTIAL BETWEEN THE SATELLITE AND THE PLASMA USING A 100-M TIP-TO-TIP DIPOLE ANTENNA. THE ANTENNA ELEMENTS WERE COPPER-BERYLLIUM STEM EXTENDABLE ANTENNAS AND WERE 0.64 CM DIAMETER TUBES WHEN EXTENDED. TWO 50-M ELEMENTS PLUS THE 1.7-M SPACECRAFT BODY MADE TOTAL LENGTH 101.7M. THE ANTENNA ELEMENTS WERE INSULATED EXCEPT FOR 20 METERS AT THE ENDS. THUS FOR AMBIENT PLASMA CONDITIONS, THE CONDUCTING SEGMENTS OF THE ANTENNA WERE POSITIONED OUTSIDE THE SHEATH REGION. DC ELECTRIC FIELDS FROM 0.1 TO 20 MILLIVOLTS/M WERE MEASURED AND AC FIELDS IN THE FREQUENCY RANGE FROM 3 TO 200 HZ WERE MEASURED FROM 1 TO 100 MICROVOLTS/M.

----- STP P78-2, BLAKE-----

INVESTIGATION NAME- ENERGETIC PROTON DETECTOR

NSSDC ID- 79-007A-14

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - J.B. BLAKE

AEROSPACE CORP

BRIEF DESCRIPTION

THIS EXPERIMENT (PART OF SC2) MEASURED THE PROTON FLUX IN THE ENERGY RANGE FROM 20 TO 1000 KEV IN DIFFERENTIAL CHANNEL PLUS AN INTEGRAL FLUX IN THE RANGE FROM 1 TO 2 MEV.

----- STP P78-2, COHEN-----

INVESTIGATION NAME- ELECTRON GUN-ION GUN

NSSDC ID- 79-007A-07

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
TECHNOLOGY
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - H.A. COHEN

USAF GEOPHYS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT (SC4) CONSISTED OF AN ELECTRON BEAM SYSTEM (EBS) AND A POSITIVE ION BEAM SYSTEM (PIBS), WHICH WERE FLOWN TO CONTROL THE EJECTION, RESPECTIVELY, OF NEGATIVE CHARGE (ELECTRONS) AND POSITIVE CHARGE (XENON IONS) FROM THE SPACE VEHICLE. THE EBS CONSISTED OF A CONTROL GRID AND AN INDIRECTLY HEATED OXIDE-COVERED CATHODE, WHICH WAS KEPT AT A CONTROLLED NEGATIVE POTENTIAL WITH RESPECT TO THE SPACE VEHICLE. THE CONTROLLED NEGATIVE POTENTIAL DETERMINED THE ENERGY OF EJECTED ELECTRONS AND VARIED IN STEPS AS FOLLOWS (IN VOLTS) -- 50, 150, 300, 500, 1500, AND 3000. THE CONTROL GRID WAS NORMALLY KEPT NEGATIVE WITH RESPECT TO THE CATHODE AND WAS PULSED POSITIVELY TO ALLOW ELECTRON EJECTION CURRENT. THE DURATION AND ELECTRON CURRENT LEVEL OF THE PULSE WERE CONTROLLED BY GROUND COMMAND. A FOCUSING ELEMENT BETWEEN THE CONTROL GRID AND THE GROUND EXIT ANODE SERVED TO REDUCE THE BEAM DIVERGENCE. THE MAGNITUDE OF THE BEAM CURRENT COULD VARY SIX STEPS (IN MILLIAMPERES = 0.001, 0.01, 0.10, 1.0, 6.0, AND 13). THE MAXIMUM POWER DRAWN WAS 42 W. MOUNTED IN BONDED ELECTRICAL CONTACT WITH THE SPACECRAFT FRAME GROUND, THE EBS WAS ORIENTED SO THAT THE BEAM AXIS WAS PERPENDICULAR TO THE SPACECRAFT SPIN AXIS. A PROTECTIVE APERTURE COVER WAS REMOVED BY GROUND COMMAND WHEN THE SPACECRAFT WAS IN ORBIT. THE PIBS CONSISTED OF A PENNING DISCHARGE-CHAMBER ION SOURCE AND A CONTROL GRID. THE ION SOURCE CONSISTS OF AN IONIZATION CHAMBER AND THE BEAM FORMATION ELECTRODES. A CYLINDER OF PRESSURED XENON CONSTITUTES THE GAS SOURCE AND WAS CONTROLLED BY A LEAK VALVE WITH THE FLOW RATE COMMANDABLE FROM THE GROUND. THE INTENSITY AND DURATION OF THE ION BEAM WAS ALSO DETERMINED BY GROUND COMMAND. THE TWO BEAM BIAS VOLTAGES ARE 1000 V D.C. AND 2000 V A.C., AND THE FIVE SELECTABLE BEAM INTENSITY LEVELS WERE (IN MILLIAMPERES) -- 0.3, 0.5, 1.0, 1.5, AND 2.0. DURING MAXIMUM BEAM EJECTION, THE POWER DRAWN WAS 60 W. THE PIBS NOZZLE WAS THE ELEMENT THAT CONTROLS THE NATURE OF THE EJECTED BEAM, AND THE THIN WIRES MOUNTED ON TOP OF THE NOZZLE COULD NEUTRALIZE ALL OR A FRACTION (INCLUDING ZERO) OF THE BEAM, DEPENDING ON SATELLITE EXPERIMENT REQUIREMENTS. THE EXPELLANT STORAGE TANK WAS CONNECTED TO THE ION SOURCE THROUGH A PRESSURE REGULATOR, A SOLENOID-OPERATED LATCHING, A POROUS PLUG, AND AN INSULATOR. THE ION SOURCE WAS MAINTAINED UNDER VACUUM AND OPENED TO THE ATMOSPHERE IN ORBIT ON COMMAND.

----- STP P78-2, DEFOREST-----

INVESTIGATION NAME- UCSD CHARGED PARTICLE DETECTOR

NSSDC ID- 79-007A-11

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - S.E. DEFOREST

U OF CALIF, SAN DIEGO

BRIEF DESCRIPTION

THIS EXPERIMENT (SC9) MEASURED THE ELECTRON AND ION DIFFERENTIAL FLUX, ENERGY, AND PITCH ANGLE DISTRIBUTION. THIS PARTICLE DETECTOR MEASURED ENERGY SPECTRA IN 64 STEPS BETWEEN 1 AND 70,000 EV. THE ACCEPTANCE ANGLE OF THE TELESCOPE WAS 5 DEG HALF-ANGLE. THIS SAME TYPE INSTRUMENT FLEW ON THE ATS 5 AND ATS 6 SPACECRAFT.

----- STP P78-2, FENNELL-----

INVESTIGATION NAME- SPACECRAFT SHEATH FIELDS DETECTOR

NSSDC ID- 79-007A-06

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - J.F. FENNELL

AEROSPACE CORP

BRIEF DESCRIPTION

THE EXPERIMENT (PART OF SC2) CONTAINED THREE ELECTROSTATIC ANALYZERS -- TWO MOUNTED 180 DEG APART ON BOOMS, AND THE THIRD MOUNTED ON THE SPACECRAFT BODY. THE THREE SENSORS HAD THE SAME LOOK DIRECTION, SO THAT IF THERE WERE NO ELECTRIC FIELDS ABOUT THE SATELLITE, ALL THREE SENSORS WOULD MEASURE THE SAME FLUX, SPECTRUM, AND ANGULAR DISTRIBUTION OF ELECTRONS AND PROTONS IN THE ENERGY RANGE 1 TO 1000 EV. AN OPTICAL DATA TRANSMISSION SYSTEM WAS USED TO TELEMETER DIGITAL DATA FROM THE ANALYZERS TO THE SATELLITE DATA PROCESSING SYSTEM TO MAINTAIN ELECTRICAL ISOLATION AT THE ANALYZERS. THE POTENTIAL OF THE SPHERES RELATIVE TO THE SATELLITE REFERENCE POINT WAS ALSO MEASURED. POTENTIAL MEASUREMENTS AT THREE POSITIONS IN THE PLASMA SHEATH WERE OBTAINED. THE EXPERIMENT WAS FUNDED BY SAMSO.

----- STP P78-2, HALL-----

INVESTIGATION NAME- QUARTZ CRYSTAL MICROBALANCES IN
RETARDING POTENTIAL ANALYZERS

NSSDC ID- 79-007A-03

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - D.F. HALL
OI - D.E. PRINCE

AEROSPACE CORP
USAF MATERIALS LAB

BRIEF DESCRIPTION

IN THIS EXPERIMENT (PART OF ML12) TWO QUARTZ CRYSTAL MICROBALANCES WERE PLACED IN RETARDING POTENTIAL ANALYZERS, WITH ONE MICROBALANCE-ANALYZER SET MOUNTED ON THE SPACECRAFT SIDE, AND THE OTHER SET PLACED ON A SPACECRAFT END MAINTAINED IN CONTINUOUS SHADOW. THE RETARDING POTENTIAL ANALYZER WAS USED TO EXCLUDE IONS FROM THE MICROBALANCE AND TO MAINTAIN A ZERO ELECTRIC FIELD CONDITION AT THE SENSOR. TO DETERMINE THE DEPENDENCE OF CONTAMINATION RATE UPON SURFACE CHARGE, MEASUREMENTS WERE MADE WITH AND WITHOUT THE RETARDING POTENTIAL BIAS. THE QUARTZ SENSORS HAD AN ACTIVE TEMPERATURE CONTROL AND COULD BE OPERATED OVER A RANGE OF TEMPERATURES FROM -60 TO 60 DEG C.

----- STP P78-2, HALL-----

INVESTIGATION NAME- THERMAL CONTROL SAMPLE MONITOR

NSSDC ID- 79-007A-04

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - D.F. HALL
OI - D.E. PRINCE

AEROSPACE CORP
USAF MATERIALS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT (PART OF ML12) EVALUATED THE PERFORMANCE OF THERMAL CONTROL MATERIALS AS A FUNCTION OF ORBIT CONTAMINATION CONDITIONS. THE SENSOR MEASURED THE BACKFACE TEMPERATURE OF EIGHT THERMAL CONTROL MATERIAL SAMPLES. THE INSTRUMENTS WERE POSITIONED CONTIGUOUS WITH THE QUARTZ CRYSTAL MONITORS. IT WAS POSSIBLE TO HEAT THE SAMPLES AND TO PURGE CONTAMINANTS WHICH FROZE OUT ON THE TEST SURFACE.

----- STP P78-2, HARDY-----

INVESTIGATION NAME- RAPID SCAN PARTICLE DETECTOR

NSSDC ID- 79-007A-12

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - D.A. HARDY

USAF GEOPHYS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT (SC5) EMPLOYED CURVED PLATE ELECTROSTATIC ANALYZERS AND SOLID STATE SPECTROMETERS TO MEASURE THE FLUX OF ELECTRONS AND IONS. THE EXPERIMENT RETURNED A SPECTRUM FOR BOTH ELECTRONS AND IONS ONCE PER SECOND IN TWO ORTHOGONAL DIRECTIONS. THE ELECTRON FLUX WAS MEASURED IN SIXTEEN ENERGY RANGES SPANNING FROM 50 EV TO 1.1 MEV. THE ION FLUX WAS MEASURED IN EIGHTEEN ENERGY RANGES SPANNING FROM 50 EV TO 35 MEV. ANY GIVEN ENERGY CHANNEL CAN BE READ OUT WITH A TIME RESOLUTION OF 240 MICROSECONDS.

----- STP P78-2, JOHNSON-----

INVESTIGATION NAME- ENERGETIC ION SPECTROMETER

NSSDC ID- 79-007A-13

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - R.G. JOHNSON

LOCKHEED PALO ALTO

BRIEF DESCRIPTION

THIS EXPERIMENT (SC8) MEASURED THE FLUX OF IONS, WITH MASS RANGE 1 TO 150 U, IN THE ENERGY RANGE FROM 100 TO 20,000 EV. THE SENSOR WAS AN ENERGETIC ION MASS SPECTROMETER.

----- STP P78-2, KOONS-----

INVESTIGATION NAME- CHARGING ELECTRICAL EFFECTS ANALYZER

NSSDC ID- 79-007A-02

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
TECHNOLOGY
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - H.C. KOONS

AEROSPACE CORP

BRIEF DESCRIPTION

THE EXPERIMENT (PART OF SC1) MEASURED ELECTROMAGNETIC INTERFERENCE IN THE RANGE 100 TO 1.67 HZ. THREE SEPARATE INSTRUMENTS WERE USED. THE FREQUENCY RANGE FROM 2 TO 30 MHZ WAS MEASURED WITH A SWEPT FREQUENCY ANALYZER. THE FREQUENCY BAND 100 TO 50 KHZ WAS MONITORED BY A 10-CHANNEL, FIXED-FREQUENCY ANALYZER. THE CAPABILITY ALSO EXISTED, TO TELEMETER BROADBAND SIGNALS FROM SENSORS IN THE FREQUENCY BAND 100 TO 5000 HZ. THE ANALYZER SAMPLED SIGNALS FROM A VARIETY OF SENSORS, INCLUDING SOLAR ARRAY BUS, POWER LINE BUS, TYPICAL COMMAND LINE, EXTERNAL SHORT DIPOLE, AND ELECTRIC FIELD DETECTOR BOOM. THIS EXPERIMENT WAS FUNDED BY SAMSO.

----- STP P78-2, LEDLEY-----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- 79-007A-08

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM/CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
PLANETARY MAGNETIC FIELD
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - B.G. LEDLEY

NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT (SC11) OBTAINED TRIAXIAL MEASUREMENTS OF THE GEOMAGNETIC FIELD. A BOOM-MOUNTED (A 7-M BOOM) FLUXGATE MAGNETOMETER WAS USED. TIME RESOLUTION WAS FOUR VECTOR PER S. FIELD RESOLUTION WAS APPROXIMATELY 0.3 NT WITH A DYNAMIC RANGE OF PLUS AND MINUS APPROXIMATELY 450 NT PER AXIS. SENSOR RESPONSE WAS FROM DC TO 70 HZ.

----- STP P78-2, MIZERA-----

INVESTIGATION NAME- SPACECRAFT SURFACE POTENTIAL MONITOR

NSSDC ID- 79-007A-01

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
TECHNOLOGY
SPACE PLASMAS

PERSONNEL
PI - P.F. MIZERA

AEROSPACE CORP

BRIEF DESCRIPTION

THE EXPERIMENT (PART OF SC1) MEASURED THE SURFACE POTENTIAL OF SEVEN DIFFERENT TYPES OF MATERIALS RELATIVE TO A GOLD CYLINDRICAL COMMON REFERENCE POINT ON THE SATELLITE. THE SAMPLE WAS MOUNTED ON ONE SURFACE OF A DIELECTRIC SLAB, AND A CONDUCTING PLATE WAS MOUNTED ON THE OTHER SURFACE. THE SURFACE POTENTIAL WAS MEASURED FROM LEAKAGE CURRENTS AND BY A CHOPPED ELECTROMETER (MONROE DETECTORS). SOME OF THE MATERIALS USED WERE: SILICON, CLOTH FABRIC, SOLAR CELL COVER GLASSES, GOLD (REFERENCE), SILVER-TEFLON, AND KAPTON MULTILAYER INSULATION. FIVE OF THE SAMPLES WERE PLACED ON THE SIDES OF THE SATELLITE AND ROTATED IN AND OUT OF SUNLIGHT. FOUR SAMPLES WERE LOCATED AT THE END OF THE SPACECRAFT IN THE SHADOW. THIS EXPERIMENT WAS FUNDED BY SAMSO.

ORIGINAL PAGE IS
OF POOR QUALITY

----- STP P78-2, REAGAN-----

INVESTIGATION NAME- HIGH-ENERGY PARTICLE DETECTOR

NSSDC ID- 79-007A-15

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - J.B. REAGAN

LOCKHEED PALO ALTO

BRIEF DESCRIPTION

THIS EXPERIMENT (SC3) MEASURED THE ELECTRON FLUX IN THE 0.3 TO 2.1 MEV RANGE, THE PROTON FLUX IN THE 1 TO 100 MEV RANGE, AND ALPHA PARTICLES FROM 6 TO 60 MEV. A HIGH-ENERGY PARTICLE SPECTROMETER WAS USED TO DETERMINE FLUX AND PITCH ANGLE DISTRIBUTIONS.

----- STP P78-2, REASONER-----

INVESTIGATION NAME- LIGHT ION MASS SPECTROMETER

NSSDC ID- 79-007A-09

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM/CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - D.L. REASONER

NASA-MSFC

BRIEF DESCRIPTION

THIS EXPERIMENT (SC7) MEASURED THE ION DENSITY, TEMPERATURE, AND DRIFT. THE LIGHT ION SPECTROMETER WAS BASICALLY THE SAME INSTRUMENT FLOWN ON OGO 5, EXCEPT THAT ONE ADDITIONAL SENSOR WAS ADDED, AND RETARDING POTENTIAL GRIDS WERE INCORPORATED SO THAT PLASMA DRIFT CAN BE MEASURED.

----- STP P78-2, SAGALYN-----

INVESTIGATION NAME- PLASMA PROBE

NSSDC ID- 79-007A-10

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - R.C. SAGALYN

USAF GEOPHYS LAB

BRIEF DESCRIPTION

THE PLASMA PROBE EXPERIMENT (SC6) MEASURED THE ELECTRON AND ION DENSITIES IN THE RANGE $1.0E-1$ TO $1.0E+4$ PER CU CM, ION AND ELECTRON TEMPERATURES IN THE RANGE 0 TO 100 EV AND VEHICLE POTENTIAL IN THE RANGE -100 TO +100 VOLTS. THE SENSORS CONSISTED OF THREE PLANAR GRIDDED PROBES, TWO MOUNTED ON A 3 METER INSULATED BOOM AND THE OTHER BODY MOUNTED ON A CONDUCTING SURFACE.

***** TIP 1*****

SPACECRAFT COMMON NAME- TIP 1

ALTERNATE NAMES- TRIAD 1, TRIAD OI 1X
TRIAD A, O6173
TRIAD

NSSDC ID- 72-069A

LAUNCH DATE- 09/02/72
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- SCOUT

WEIGHT- 94. KG

SPONSORING COUNTRY/AGENCY
UNITED STATES

DOD-NAVY

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 100.7 MIN
PERIAPSIS- 716.0 KM ALT

EPOCH DATE- 09/04/72
INCLINATION- 90.1 DEG
APOAPSIS- 863.0 KM ALT

PERSONNEL

PM - J. DASSOULAS
PS - R.E. FISCHHELL

APPLIED PHYSICS LAB
APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THIS THREE BODY SPACECRAFT WAS CONNECTED BY BOOMS WHICH SERVED AS GRAVITY GRADIENT STABILIZERS IN THE RADIAL DIRECTION. A MOMENTUM WHEEL WAS USED FOR STABILIZATION IN ROLL AND YAW. THE PRIMARY FUNCTION OF THE SPACECRAFT WAS TO TEST VARIOUS CONCEPTS FOR IMPROVING THE USN TRANSIT NAVIGATION SYSTEM. THE POWER WAS SUPPLIED BY A RADIO ISOTOPE THERMAL ELECTRIC GENERATOR (RTG).

----- TIP 1, POTEMRA-----

INVESTIGATION NAME- TRIAXIAL FLUXGATE MAGNETOMETER

NSSDC ID- 72-069A-01

INVESTIGATIVE PROGRAM
NAVIGATION TECHNOLOGY

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - T.A. POTEMRA

APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A TRIAXIAL FLUXGATE MAGNETOMETER DESIGNED TO MEASURE VECTOR FIELDS WITH MAGNITUDES UP TO 50,000 NT. MEASUREMENTS WERE MADE BY SAMPLING EACH AXIS SEQUENTIALLY AT A RATE OF 2.25 SAMPLES/S. DIGITIZATION RESOLUTION WAS ABOUT 10 NT AS GIVEN BY A 13-BIT ANALOG TO DIGITAL CONVERTER, BUT ZERO-LEVEL DRIFTS WERE NOT READILY CHECKED. AS SUCH, THE EXPERIMENT WAS MOST USEFUL IN STUDIES OF MAGNETIC FLUCTUATIONS. DUE TO THE REAL-TIME DATA TRANSMISSION AND THE LOCATIONS OF THE TRACKING STATIONS, MOST OF THE DATA OBTAINED RELATED TO NORTHERN AND SOUTHERN HEMISPHERE HIGH LATITUDES.

***** TIROS-N*****

SPACECRAFT COMMON NAME- TIROS-N
ALTERNATE NAMES- 11060

NSSDC ID- 78-096A

LAUNCH DATE- 10/13/78
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS

WEIGHT- 588.9 KG

SPONSORING COUNTRY/AGENCY
UNITED STATES

NOAA-NESS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 102. MIN
PERIAPSIS- 846. KM ALT

EPOCH DATE- 10/14/78
INCLINATION- 98.9 DEG
APOAPSIS- 862. KM ALT

PERSONNEL

MG - M.L. GARBACZ
PM - J. FULLER, JR.
PS - A. ARKING

NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

TIROS-N WAS AN OPERATIONAL METEOROLOGICAL SATELLITE FOR USE IN THE NATIONAL OPERATIONAL ENVIRONMENTAL SATELLITE SUBSYSTEM (NOESS) AND SUPPORTED THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP) DURING 1978-84. THE SATELLITE DESIGN PROVIDED AN ECONOMICAL AND STABLE SUN-SYNCHRONOUS PLATFORM FOR ADVANCED OPERATIONAL INSTRUMENTS TO MEASURE THE EARTH'S ATMOSPHERE, ITS SURFACE AND CLOUD COVER, AND THE NEAR-SPACE ENVIRONMENT. PRIMARY SENSORS INCLUDED AN ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) FOR OBSERVING DAYTIME AND NIGHTTIME GLOBAL CLOUD COVER AND AN OPERATIONAL VERTICAL SOUNDER FOR OBTAINING TEMPERATURE AND WATER VAPOR PROFILES THROUGH THE EARTH'S ATMOSPHERE. SECONDARY EXPERIMENTS CONSISTED OF A SPACE ENVIRONMENT MONITOR (SEM), WHICH MEASURES THE PROTON AND ELECTRON FLUX NEAR THE EARTH, AND A DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCLS), WHICH PROCESSED AND RELAYED TO CENTRAL DATA ACQUISITION STATIONS THE VARIOUS METEOROLOGICAL DATA RECEIVED FROM FREE-FLOATING BALLOONS AND OCEAN BUOYS DISTRIBUTED AROUND THE GLOBE. THE SATELLITE WAS BASED UPON THE BLOCK 5D SPACECRAFT BUS DEVELOPED FOR THE US AIR FORCE, AND WAS CAPABLE OF MAINTAINING AN EARTH-POINTING ACCURACY OF BETTER THAN PLUS OR MINUS 0.1 DEG WITH A MOTION RATE OF LESS THAN 0.035 DEG/S.

----- TIROS-N, NESS STAFF-----

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)

NSSDC ID- 78-096A-01

INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - NESS STAFF

NOAA-NESS

BRIEF DESCRIPTION

THE TIROS-N ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) WAS A FOUR-CHANNEL SCANNING RADIOMETER CAPABLE OF PROVIDING GLOBAL DAYTIME AND NIGHTTIME SEA SURFACE TEMPERATURE, ICE, SNOW, AND CLOUD INFORMATION. THESE DATA WERE OBTAINED ON A DAILY BASIS FOR USE IN WEATHER ANALYSIS AND FORECASTING. THE MULTISPECTRAL RADIOMETER OPERATED IN THE SCANNING MODE AND MEASURES EMITTED AND REFLECTED RADIATION IN THE FOLLOWING SPECTRAL INTERVALS: CHANNEL 1 (VISIBLE), 0.55 TO 0.9 MICROMETER, CHANNEL 2 (NEAR IR), 0.725 MICROMETER TO DETECTOR CUT OFF AROUND 1.3 MICROMETERS, CHANNEL 3 (IR WINDOW), 10.5 TO 11.5 MICROMETERS, AND CHANNEL 4 (IR WINDOW), 3.55 TO 3.93 MICROMETERS. ALL FOUR CHANNELS HAD A SPATIAL RESOLUTION OF 1.1 KM, AND THE TWO IR WINDOW CHANNELS HAD A THERMAL RESOLUTION OF

0.12 K AT 300 K. THE AVHRR WAS CAPABLE OF OPERATING IN BOTH REAL-TIME OR RECORDED MODES. REAL-TIME OR DIRECT READOUT DATA WERE TRANSMITTED TO GROUND STATIONS BOTH AT LOW (4 KM) RESOLUTION VIA AUTOMATIC PICTURE TRANSMISSION (APT) AND AT HIGH (1 KM) RESOLUTION VIA HIGH RESOLUTION PICTURE TRANSMISSION (HRPT). DATA RECORDED ON BOARD WERE AVAILABLE FOR CENTRAL PROCESSING. THEY INCLUDED GLOBAL AREA COVERAGE (GAC) DATA, HAD A RESOLUTION OF 4 KM, AND LOCAL AREA COVERAGE (LAC) DATA, WHICH CONTAINED DATA FROM SELECTED PORTIONS OF EACH ORBIT WITH A 1 KM RESOLUTION. IDENTICAL EXPERIMENTS WERE FLOWN ON THE OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- TIROS-N, NESS STAFF-----

INVESTIGATION NAME- OPERATIONAL VERTICAL SOUNDER

NSSDC ID- 78-096A-02 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE TIROS-N OPERATIONAL SOUNDER CONSISTED OF THREE INSTRUMENTS DESIGNED TO DETERMINE RADIANCES NEEDED TO CALCULATE TEMPERATURE AND HUMIDITY PROFILES OF THE ATMOSPHERE FROM THE SURFACE TO THE STRATOSPHERE (APPROXIMATELY 1 MB). THE FIRST INSTRUMENT, THE HIGH RESOLUTION INFRARED SPECTROMETER (HIRS/2), HAD 20 CHANNELS AND MADE MEASUREMENTS IN THE FOLLOWING SPECTRAL INTERVALS: CHANNEL 1 - THE 3.7-MICROMETER WINDOW REGION, CHANNEL 2 - THE 4.3-MICROMETER CO2 BAND, CHANNEL 3 - THE 9.7-MICROMETER OZONE BAND, CHANNEL 4 - THE 11.1-MICROMETER WINDOW REGION, CHANNELS 5 THROUGH 11 - THE 15-MICROMETER CO2 BAND (13.3, 13.6, 14.0, 14.3, 14.5, 14.75, AND 15.0), AND CHANNELS 12 THROUGH 14 - THE 18-MICROMETER ROTATIONAL WATER VAPOR BANDS (18.8, 23.15, AND 29.4). THE SECOND INSTRUMENT, THE STRATOSPHERIC SOUNDING UNIT, HAD THREE CHANNELS OPERATING AT 14.97 MICROMETERS USING SELECTIVE ABSORPTION BY PASSING THE INCOMING RADIATION THROUGH THREE PRESSURE MODULATED CELLS CONTAINING CO2. THE THIRD INSTRUMENT, THE MICROWAVE SOUNDING UNIT, HAD FOUR CHANNELS OPERATING IN THE 50 TO 60 GHZ OXYGEN BAND (50.3, 53.7, 55.0, AND 57.9) TO OBTAIN TEMPERATURE PROFILES WHICH ARE FREE OF CLOUD INTERFERENCE. THE INSTRUMENTS WERE CROSS-COURSE SCANNING DEVICES UTILIZING A STEP TO PROVIDED A TRAVERSE SCAN WHILE THE ORBITAL MOTION OF THE SATELLITE PROVIDES SCANNING IN THE ORTHOGONAL DIRECTION. SIMILAR EXPERIMENTS WERE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- TIROS-N, NESS STAFF-----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)

NSSDC ID- 78-096A-03 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS) ON TIROS-N WAS DESIGNED TO MEET THE METEOROLOGICAL DATA NEEDS OF THE UNITED STATES AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP). THE SYSTEM RECEIVED LOW DUTY CYCLE TRANSMISSIONS OF METEOROLOGICAL OBSERVATIONS FROM FREE-FLOATING BALLOONS, OCEAN BUOYS, OTHER SATELLITES, AND FIXED GROUND-BASED SENSOR PLATFORMS DISTRIBUTED AROUND THE GLOBE. THESE OBSERVATIONS WERE ORGANIZED ON BOARD THE SPACECRAFT AND RETRANSMITTED WHEN THE SPACECRAFT COMES IN RANGE OF A COMMAND AND DATA ACQUISITION (CDA) STATION. FOR FREE-MOVING BALLOONS, THE DOPPLER FREQUENCY SHIFT OF THE TRANSMITTED SIGNAL WAS OBSERVED TO CALCULATE THE LOCATION OF THE BALLOONS. THE DCS WAS EXPECTED, FOR A MOVING SENSOR PLATFORM, TO HAVE A LOCATION ACCURACY OF 5 TO 8 KM RMS, AND A VELOCITY ACCURACY OF 1 TO 1.6 M/S. THIS SYSTEM HAD THE CAPABILITY OF ACQUIRING DATA FROM UP TO 2000 PLATFORMS PER DAY. IDENTICAL EXPERIMENTS WERE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- TIROS-N, WILLIAMS-----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NSSDC ID- 78-096A-04 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS NOAA-ERL
OI - C.O. BOSTROM APPLIED PHYSICS LAB
OI - H.H. SAUER NOAA-ERL

BRIEF DESCRIPTION

THIS EXPERIMENT WAS AN EXTENSION OF THE SOLAR PROTON MONITORING EXPERIMENT FLOWN ON THE ITOS SPACECRAFT SERIES. THE EXPERIMENT PACKAGE CONSISTED OF FOUR DETECTOR SYSTEMS AND A DATA PROCESSING UNIT. THE LOW-ENERGY PROTON ALPHA TELESCOPE (LEPAT) SEPARATELY MEASURED IN FIVE ENERGY RANGES BOTH PROTONS BETWEEN 150 KEV AND 40 MEV AND ALPHA PARTICLES BETWEEN 150 KEV/N AND 25 MEV/N. THERE WERE TWO LEPATS VIEWING IN THE ANTI-SUN AND ANTI-EARTH DIRECTIONS WITH 60-DEG VIEWING CONES. THE PROTON OMNIDIRECTIONAL DETECTOR (POD) MEASURED PROTONS ABOVE 10, 30, AND 60 MEV, ELECTRONS ABOVE 140 KEV, AND PROTONS AND ELECTRONS (INSEPARABLE) ABOVE 750 KEV. THE HIGH-ENERGY PROTON ALPHA TELESCOPE (HEPAT) HAD A 50-DEG VIEWING CONE, VIEWED IN THE ANTI-EARTH DIRECTION, AND MEASURED PROTONS ABOVE 400 MEV AND PROTONS AND ALPHA PARTICLES ABOVE 600 AND 1000 MEV/N. THE TOTAL ENERGY DETECTOR (TED) MEASURED TOTAL ENERGY ABOVE 1 KEV.

***** UK 5*****

SPACECRAFT COMMON NAME- UK 5

ALTERNATE NAMES- UNITED KINGDOM 5, PL-732B
ARIEL 5

NSSDC ID- 74-077A

LAUNCH DATE- 10/15/74 WEIGHT- 135. KG
LAUNCH SITE- SAN MARCO PLATFORM, OFF COAST OF KENYA
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY

UNITED KINGDOM SRC
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC EPOCH DATE- 10/16/74
ORBIT PERIOD- 95.3 MIN INCLINATION- 2.9 DEG
PERIAPSIS- 512.0 KM ALT APOAPSIS- 557.0 KM ALT

PERSONNEL

MG - J.R. HOLTZ NASA HEADQUARTERS
SC - N.G. ROMAN NASA HEADQUARTERS
PM - J.P. CORRIGAN NASA-GSFC
PS - S.S. HOLT NASA-GSFC

BRIEF DESCRIPTION

THE UK 5 SPACECRAFT WAS DESIGNED TO CARRY SIX EXPERIMENTS THAT MEASURE THE SPECTRUM, POLARIZATION, AND PULSAR FEATURES OF NONSOLAR X-RAY SOURCES. THE SPACECRAFT WAS SPIN STABILIZED, AND TWO EXPERIMENTS SCANNED THE SKY PERPENDICULAR TO THE SPIN AXIS, WHILE FOUR EXPERIMENTS POINTED PARALLEL TO THE SPIN AXIS. DATA WERE STORED ON BOARD THE SPACECRAFT IN A CORE STORAGE AND DUMPED TO GROUND STATIONS ONCE PER ORBIT.

----- UK 5, BOYD-----

INVESTIGATION NAME- 0.3- TO 30-KEV COSMIC X RAY WITH A
ROTATION COLLIMATOR

NSSDC ID- 74-077A-01

INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

PI - R.L.F. BOYD U COLLEGE LONDON
OI - A.P. WILLMORE U OF BIRMINGHAM
OI - P.W. SANFORD U COLLEGE LONDON

BRIEF DESCRIPTION

THIS EXPERIMENT COMBINED THE FUNCTION OF OBSERVING X-RAYS IN DIFFERENT ENERGY RANGES WITH THAT OF STAR TRACKING. THE EXPERIMENT CONTAINED A ROTATION COLLIMATOR, UTILIZING THE SATELLITE SPIN, BEHIND WHICH THERE WERE THREE DETECTORS. THE FIELD OF VIEW WAS A CONE WITH A SEMI-ANGLE OF 10 DEG TO 20 DEG, DEPENDING ON THE TYPE OF RADIATION VIEWED BY THE DIFFERENT DETECTORS. THE FIRST DETECTOR WAS A VISIBLE-LIGHT PHOTOMULTIPLIER THAT ENABLED THE SPIN AXIS TO BE ACCURATELY DETERMINED BY VIEWING THE BACKGROUND OF OPTICAL STARS. SECONDLY, THERE WAS AN ARRAY OF CHANNEL ELECTRON MULTIPLIERS, WITH SELECTABLE FILTERS, COVERING THE WAVELENGTH RANGE 0.3 TO 6 KEV. THIRDLY, THERE WAS A GROUP OF PROPORTIONAL COUNTERS COVERING THE RANGE 2.5 TO 30 KEV. IT WAS ESTIMATED THAT SOURCE POSITIONS COULD BE DETERMINED TO WITHIN 2 ARC MIN FOR BRIGHT SOURCES.

----- UK 5, BOYD-----

INVESTIGATION NAME- HIGH-RESOLUTION SOURCE SPECTRA

NSSDC ID- 74-077A-03

INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

PI - R.L.F. BOYD
OI - A.P. WILLMORE
OI - P.W. SANFORD

U COLLEGE LONDON
U OF BIRMINGHAM
U COLLEGE LONDON

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A HIGH-RESOLUTION, PROPORTIONAL-COUNTER SPECTROMETER WITH A 128-CHANNEL PULSE-HEIGHT ANALYZER, AND RESPONDED TO PHOTONS IN THE 2- TO 30-KEV ENERGY RANGE. THE SPECTRA OF SOURCES WERE EXAMINED IN GREATER DETAIL THAN HAD BEEN PREVIOUSLY POSSIBLE. LINE EMISSION FOR CERTAIN ELEMENTS (E.G., IRON) COULD ALSO BE IDENTIFIED. THE DETECTOR VIEWED IN A DIRECTION PARALLEL TO THE SPIN AXIS AND, THEREFORE, CONTINUED TO OBSERVE THE SAME PIECE OF SKY FOR AS LONG AS THE POSITION OF THE SATELLITE SPIN AXIS REMAINED UNALTERED. THE EXPERIMENT AXIS POINTED APPROXIMATELY 2 DEG OFF THE SPIN AXIS, SO THAT WHEN OBSERVING A SOURCE ALSO 2 DEG OFF THE SPIN AXIS THE SOURCE PASSED IN AND OUT OF THE FIELD OF VIEW DURING EACH ROTATION. THIS PERMITTED THE BACKGROUND FLUX TO BE SAMPLED EVERY SPIN PERIOD BY RECORDING THE SPECTRAL INFORMATION IN FOUR SETS OF LOCATIONS, EACH CORRESPONDING TO A QUADRANT OF THE SPIN CYCLE. THIS SHOULD HAVE OVERCOME THE LACK OF INFORMATION ON POSSIBLE FLUCTUATIONS IN THE BACKGROUND FLUX DURING AN ORBIT'S INTEGRATION. THE EXPERIMENT COULD ALSO HAVE BEEN OPERATED IN A MODE IN WHICH PERIODICITIES IN THE RANGE TYPICAL OF PULSAR FREQUENCIES WERE DETECTED.

----- UK 5, ELLIOT-----

INVESTIGATION NAME- HIGH-ENERGY COSMIC X-RAY SPECTRA

NSSDC ID- 74-077A-05

INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

PI - H. ELLIOT
OI - J.J. QUENBY
OI - A.R. ENGEL

IMPERIAL COLLEGE
IMPERIAL COLLEGE
IMPERIAL COLLEGE

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO EXTEND THE SPECTRAL INFORMATION ON SELECTED X-RAY SOURCES IN THE ENERGY REGION ABOVE 20 KEV. MEASUREMENTS WERE POSSIBLE UP TO 2 MEV, ALTHOUGH THE EFFICIENCY OF THE DETECTOR FELL STEEPLY AT THIS ENERGY. THE DETECTOR AXIS WAS INCLINED A FEW DEG WITH RESPECT TO THE SATELLITE SPIN AXIS SO THAT IT CONED AS THE SATELLITE SPUN. THE COUNTING RATE RESULTING FROM A POINT SOURCE A FEW DEG FROM THE SPIN AXIS WAS THUS MODULATED WITH THE SPIN PERIOD. THIS MODULATION WAS DETECTED BY DIVIDING THE SPIN CYCLE INTO FOUR SECTORS AND ANALYZING THE DIFFERENT COUNTING RATES IN EACH. IN THIS WAY, THE SOURCE INTENSITY COULD BE DETERMINED FROM THE AMPLITUDE OF THE MODULATION. FOR PULSAR OBSERVATIONS, A LARGE ENERGY WINDOW AT THE LOWER END OF THE DETECTOR RANGE WAS USED. THE OBSERVATIONS IN THIS ENERGY REGION WERE ANALYZED FOR A PULSAR PERIODICITY IN A SPECIAL SYSTEM THAT WAS PART OF THE SPACECRAFT HANDLING ELECTRONICS.

----- UK 5, HOLT-----

INVESTIGATION NAME- ALL-SKY MONITOR

NSSDC ID- 74-077A-06

INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

PI - S.S. HOLT
OI - E.A. BOLDT
OI - P.J. SERLEMITOS

NASA-GSFC
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT SCANNED THE X-RAY EMISSION FROM THE ENTIRE CELESTIAL SPHERE AT ALL TIMES, THEREBY COVERING THE LARGE AREAS THAT LAY OUTSIDE THE FIELD OF VIEW OF OTHER ONBOARD EXPERIMENTS. IT WAS A VALUABLE AID IN PROGRAMMING SATELLITE MANEUVERS SO THAT TRANSIENT EVENTS IN THE X-RAY SKY, SUCH AS NEARBY NOVAE AND X-RAY FLARES, COULD BE RAPIDLY MADE AVAILABLE FOR STUDY WITH GREATER RESOLUTION BY THE OTHER EXPERIMENTS.

----- UK 5, POUNDS-----

INVESTIGATION NAME- 2- TO 10-KEV SKY SURVEY

NSSDC ID- 74-077A-02

INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

PI - K.A. POUNDS
OI - B.A. COOKE
OI - D.J. ADAMS
OI - R.E. GRIFFITHS

U OF LEICESTER
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BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A LARGE-AREA PROPORTIONAL COUNTER ARRANGED TO VIEW IN A DIRECTION PERPENDICULAR TO THE SATELLITE SPIN AXIS. THE SATELLITE ROTATION, THEREFORE, ALLOWED A SCAN OF A 360-DEG BAND OF THE SKY. WHEN THE SATELLITE SPIN AXIS WAS ARRANGED TO POINT AT A GALACTIC POLE, THE WHOLE OF THE MILKY WAY COULD BE SCANNED AT ONCE. THE EXPERIMENT COVERED THE PHOTON ENERGY RANGE 1.5 TO 20 KEV AND EFFECTED A HIGH-SENSITIVITY SURVEY, OBTAINING SOURCE LOCATIONS, INTENSITY, AND SPECTRA. A NUMBER OF DIFFERENT MODES OF OPERATION WAS USED IN WHICH THE AVAILABLE STORAGE SPACE IN THE CORE STORE OBTAINED SPATIAL INFORMATION AT THE EXPENSE OF SPECTRAL RESOLUTION OR CONVERSELY. THE SENSITIVITY OF THE EXPERIMENT ALLOWED THE DETECTION OF SOURCES OF THE ORDER OF 10^{-4} TIMES THE INTENSITY OF SCO XR-1, WITHIN THE TIME OF ABOUT 1 D. THE ABILITY OF THE SURVEY INSTRUMENTS TO DETERMINE THE POSITIONS OF A SOURCE DEPENDED ON THE STRENGTH OF THE SOURCE AND THE NUMBER OF OTHER SOURCES IN A GIVEN PART OF THE SKY. A SOURCE OF 5×10^{-3} TIMES THE STRENGTH OF SCO XR-1 COULD BE LOCATED WITH A PRECISION OF ABOUT 15 ARC MIN.

----- UK 5, POUNDS-----

INVESTIGATION NAME- POLARIMETER/SPECTROMETER

NSSDC ID- 74-077A-04

INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

PI - K.A. POUNDS
OI - B.A. COOKE
OI - D.J. ADAMS
OI - R.E. GRIFFITHS

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BRIEF DESCRIPTION

THIS EXPERIMENT WAS A POLARIMETER/SPECTROMETER OPERATING IN THE 2- TO 8-KEV RANGE. IT USED TWO LARGE PLANE CRYSTALS, LITHIUM HYDRIDE AND GRAPHITE, IN A BRAGG SPECTROMETER WITH A HONEYCOMB COLLIMATOR. IT WAS MOUNTED TO VIEW ALONG THE SATELLITE SPIN AXIS AND TO EXAMINE THE RADIATION OF INDIVIDUAL X-RAY SOURCES FOR POSSIBLE POLARIZATION AND/OR THE EXISTENCE OF LINE EMISSIONS. IN A SOURCE OF THE BRIGHTNESS OF THE CRAB NEBULA, A POLARIZATION OF 2.5 PERCENT COULD BE DETECTED. THE EXPERIMENT ALSO CONDUCTED SEARCHES FOR PULSAR ACTIVITY. THE NATURE OF THE EXPERIMENT MADE IT POSSIBLE TO EXAMINE THE POLARIZATION OF THE PULSAR ITSELF BY LOOKING FOR DIFFERENT PULSAR BEHAVIOR IN THE SEPARATE POLARIZATION COMPONENTS.

***** UK 6*****

SPACECRAFT COMMON NAME- UK 6

ALTERNATE NAMES- UNITED KINGDOM-6, ARIEL 6
11382

NSSDC ID- 79-047A

LAUNCH DATE- 06/02/79

WEIGHT- 152. KG

LAUNCH SITE- WOLLOPS FLIGHT CENTER, UNITED STATES

LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY

UNITED KINGDOM

SRC

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC

EPOCH DATE- 06/02/79

ORBIT PERIOD- 97.3 MIN

INCLINATION- 55. DEG

PERIAPSIS- 605. KM ALT

APOAPSIS- 651. KM ALT

PERSONNEL

PM - J.E. FOSTER
PS - J.L. CULHANE

APPLETON LAB
U COLLEGE LONDON

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS MISSION WAS TO UNDERTAKE STUDIES IN HIGH-ENERGY ASTROPHYSICS. TWO X-RAY EXPERIMENTS, ONE COSMIC-RAY EXPERIMENT, AND THREE TECHNOLOGY EXPERIMENTS WERE CARRIED. THE SPACECRAFT WAS SPIN STABILIZED, WITH THE SPIN AXIS COMMANDED INTO A SEQUENCE OF ORIENTATIONS TO ACCOMMODATE THE X-RAY EXPERIMENT REQUIREMENTS.

----- UK 6, BOYD-----

INVESTIGATION NAME- X-RAY GRAZING INCIDENCE SYSTEM

NSSDC ID- 79-047A-03

INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

PI - R.L.F. BOYD
OI - A.P. WILLMORE
OI - A.M. CRUISE
OI - C.V. GOODALL

U COLLEGE LONDON
U OF BIRMINGHAM
U COLLEGE LONDON
U OF BIRMINGHAM

BRIEF DESCRIPTION

THIS SYSTEM CONSISTED OF FOUR GRAZING INCIDENCE HYPERBOLOID MIRRORS THAT REFLECTED X-RAYS THROUGH AN APERTURE/FILTER TO FOUR CONTINUOUS-FLOW PROPANE GAS DETECTORS COVERED WITH A ONE-MICROMETER POLYPROPYLENE WINDOW. THE INSTRUMENT WAS SENSITIVE TO X-RAYS FROM 0.1 TO 2 KEV AND HAD SEVEN SELECTABLE FIELDS OF VIEW FROM 0.2 TO 3.6 DEG. THE SYSTEM COULD BE OPERATED IN FOUR DIFFERENT MODES: SPECTRAL (32 CHANNELS OF PULSE HEIGHT), TIME (0.5 MS TO 16 S), PULSAR (PERIODS FROM 8 MS TO 4 HR), AND AUTOCORRELATOR (PERIODIC VARIATIONS FROM 128 MS TO 2 S). THE DETECTORS POINTED ALONG THE SPACECRAFT SPIN AXIS.

----- UK 6, FOWLER-----

INVESTIGATION NAME- COSMIC RAY

NSSDC ID- 79-047A-01

INVESTIGATIVE PROGRAM
CODE SC/CO-OPINVESTIGATION DISCIPLINE(S)
COSMIC RAYS

PERSONNEL

PI - P.H. FOWLER

U OF BRISTOL

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTED OF FOUR PI CERENKOV AND GAS SCINTILLATION COUNTERS WITH A GEOMETRIC FACTOR OF TWO SQ M-SR THAT WAS USED TO MEASURE THE CHARGE AND ENERGY SPECTRA OF THE ULTRAHEAVY COMPONENT OF COSMIC RADIATION WITH PARTICULAR EMPHASIS OF THE CHARGE REGION Z GREATER THAN OR EQUAL TO 30.

----- UK 6, POUNDS-----

INVESTIGATION NAME- X-RAY PROPORTIONAL COUNTERS

NSSDC ID- 79-047A-02

INVESTIGATIVE PROGRAM
CODE SC/CO-OPINVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

PI - K.A. POUNDS

U OF LEICESTER

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTED OF AN ARRAY OF PROPORTIONAL COUNTERS THAT OPERATED OVER THE ENERGY RANGE 1.3 TO 30 KEV. BRIGHT X-RAY SOURCES COULD BE MEASURED TO SEVERAL MICROSECONDS TIME RESOLUTION, AND SPECTRAL DATA WERE OBTAINED IN 32 CHANNELS.

***** VELA 5A*****

SPACECRAFT COMMON NAME- VELA 5A

ALTERNATE NAMES- VELA 9 (TRW), 03954

NSSDC ID- 69-046D

LAUNCH DATE- 05/23/69

WEIGHT- 259. KG

LAUNCH SITE- VANDENBERG AFB, UNITED STATES

LAUNCH VEHICLE- TITAN 3C

SPONSORING COUNTRY/AGENCY

UNITED STATES

DOD-USAF

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC

ORBIT PERIOD- 6703. MIN

PERIAPSIS- 110900. KM ALT

EPOCH DATE- 05/24/69

INCLINATION- 32.8 DEG

APOAPSIS- 112210. KM ALT

PERSONNEL

MG - ARPA STAFF

PM - SAMSO

PS - R.W. KLEBESADEL

ARPA/WASH, DC

USAF-LAS

LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

VELA 5A WAS ONE OF TWO SPIN-STABILIZED, POLYHEDRAL SATELLITES THAT COMPRISED THE FIFTH LAUNCH IN THE VELA PROGRAM. THE ORBITS OF THE TWO SATELLITES ON EACH LAUNCH WERE BASICALLY CIRCULAR AT ABOUT 17 EARTH RADII, INCLINED AT 60 DEG TO THE ECLIPTIC, AND SPACED 180 DEG APART, THUS PROVIDING A MONITORING CAPABILITY OF OPPOSITE SIDES OF THE EARTH. THE OBJECTIVES OF THE SATELLITES WERE (1) TO STUDY SOLAR AND COSMIC X RAYS, EUV, SOLAR PROTONS, SOLAR WIND, AND NEUTRONS, (2) TO CARRY OUT RESEARCH AND DEVELOPMENT ON METHODS OF DETECTING NUCLEAR EXPLOSIONS BY MEANS OF SATELLITE-BORNE INSTRUMENTATION, AND (3) TO PROVIDE SOLAR FLARE DATA IN SUPPORT OF MANNED SPACE MISSIONS. VELA 5A, AN IMPROVED VERSION OF THE EARLIER VELA SERIES SATELLITES, HAD BETTER COMMAND CAPABILITIES, INCREASED DATA STORAGE, IMPROVED POWER REQUIREMENTS, BETTER THERMAL CONTROL OF OPTICAL SENSORS, AND GREATER EXPERIMENTATION WEIGHT. POWER SUPPLIES OF 120 W WERE PROVIDED BY 22-500 SOLAR CELLS MOUNTED ON 24 OF THE SPACECRAFT'S 26 FACES. A ROTATION RATE OF 78 RPM DURING TRANSFER ORBITS AND 1 RPM AFTER FINAL ORBIT INSERTION MAINTAINED NOMINAL ATTITUDE CONTROL. EIGHT WHIP ANTENNAS AND FOUR STUB ANTENNA ARRAYS AT OPPOSITE ENDS OF THE SPACECRAFT STRUCTURE WERE USED FOR GROUND COMMANDS AND TELEMETRY.

----- VELA 5A, BAME-----

INVESTIGATION NAME- SOLAR WIND

NSSDC ID- 69-046D-05

INVESTIGATIVE PROGRAM
NUCLEAR DETECTIONINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - S.J. BAME

OI - J.R. ASBRIDGE

OI - H.E. FELTHAUSER

LOS ALAMOS SCI LAB

LOS ALAMOS SCI LAB

LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

TWO ELECTROSTATIC ANALYZER-ELECTRON MULTIPLIER UNITS WERE USED TO STUDY THE INTERPLANETARY SOLAR WIND (INCLUDING HEAVY IONS) AND PROTONS AND ELECTRONS IN THE MAGNETOTAIL. ENERGY ANALYSIS WAS ACCOMPLISHED BY CHARGING THE PLATES TO KNOWN VOLTAGE LEVELS ALLOWING THEM TO DISCHARGE WITH KNOWN RESISTANCE CAPACITOR (RC) TIME CONSTANTS. PARTICLES IN A 6-DEG BY 100-DEG FAN-SHAPED ANGULAR RANGE WERE ACCEPTED FOR ANALYSIS DURING A DECAYING VOLTAGE CYCLE. THE 100-DEG DIMENSION WAS PARALLEL TO THE SPACECRAFT SPIN AXIS FOR BOTH DETECTORS. ONE ANALYZER-MULTIPLIER UNIT STUDIED SOLAR WIND ELECTRONS IN THE ENERGY RANGE FROM 7.5 EV TO 18.5 KEV AND SOLAR WIND POSITIVE IONS (MAINLY PROTONS AND ALPHA PARTICLES) IN AN ENERGY PER CHARGE RANGE FROM 120 V TO 5 KV. THE OTHER UNIT STUDIED MAGNETOTAIL PROTONS OR ELECTRONS BETWEEN 20 EV AND 33 KEV AND SOLAR WIND HEAVY IONS IN THE ENERGY PER CHARGE RANGE BETWEEN 1 KV AND 8.3 KV.

----- VELA 5A, BAME-----

INVESTIGATION NAME- NEUTRON DETECTOR

NSSDC ID- 69-046D-07

INVESTIGATIVE PROGRAM
NUCLEAR DETECTIONINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - S.J. BAME

OI - J.R. ASBRIDGE

LOS ALAMOS SCI LAB

LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

THE NEUTRON DETECTOR CONSISTED OF A LARGE (ABOUT 3.6 KG) POLYETHYLENE MODERATOR SURROUNDING TWO HELIUM-3 FILLED PROPORTIONAL COUNTERS. NEUTRONS BETWEEN 1 AND 100 MEV WERE THERMALIZED BY THE MODERATOR AND DETECTED BY THE COUNTERS. THE INSTRUMENT WAS ALSO SENSITIVE TO PROTONS ABOVE 25 MEV.

----- VELA 5A, CHAMBERS-----

INVESTIGATION NAME- SOLAR X-RAY DETECTORS, 0.5 TO 3.0 A,
1 TO 8 A, 1 TO 16 A, 44 TO 60 A

NSSDC ID- 69-046D-02

INVESTIGATIVE PROGRAM
NUCLEAR DETECTIONINVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
SOLAR PHYSICS

PERSONNEL

PI - W.H. CHAMBERS

OI - J.C. FULLER

OI - W.E. KUNZ

OI - P.E. FEHLAU

LOS ALAMOS SCI LAB

LOS ALAMOS SCI LAB

LOS ALAMOS SCI LAB

LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO MONITOR THE SOLAR AMBIENT AND FLARE-PRODUCED FLUX OF X RAYS IN THE 0.3- TO 60-A WAVELENGTH REGION. TWO IDENTICAL X-RAY SENSOR UNITS WERE MOUNTED AT DIAMETRICALLY OPPOSED APEX POSITIONS ON THE SATELLITE. EACH UNIT CONTAINED FOUR DETECTORS -- THREE ION CHAMBERS AND A SCINTILLATION (NAI(TL)) DETECTOR. SINCE EACH ION CHAMBER HAD A HEMISPHERICAL WINDOW, THE COMBINED OUTPUT SIGNALS FROM IDENTICAL CHAMBERS IN EACH SENSOR UNIT APPROXIMATED THE RESPONSE OF AN IDEAL DETECTOR WITH A 4-PI STERADIAN FIELD OF VIEW. THE ION CHAMBERS HAD THE FOLLOWING WINDOW MATERIALS, GAS FILLS, AND WAVELENGTH RESPONSES. CHAMBER 1 -- 0.127 MM. OF BERYLLIUM, 0.9 ATM OF ARGON + 0.1 ATM OF HELIUM, 1 TO 8 A. CHAMBER 2 -- 6.35 MICROMETERS OF MYLAR OVERCOATED WITH ABOUT AN 8500-A LAYER OF ALUMINUM, 0.5 ATM OF NITROGEN, 1 TO 16 A. CHAMBER 3 -- 6.35 MICROMETERS OF MYLAR, 0.5 ATM OF NITROGEN, 1 TO 16 A AND 44 TO 60 A. THIS COMBINATION OF ION CHAMBERS ALLOWED SOLAR X-RAY FLUX MEASUREMENTS IN THE BANDS 1 TO 8 A, 1 TO 16 A, 8 TO 16 A, AND 44 TO 60 A TO BE OBTAINED UPON SUITABLE ANALYSIS OF THE DATA. THE SCINTILLATION DETECTOR USED FOR THE .3- TO 3-A WAVELENGTH REGION CONSISTED OF A THALLIUM-ACTIVATED NAI CRYSTAL OPTICALLY COUPLED TO A PMT, THE OUTPUT OF WHICH FED A FIVE-LEVEL, INTEGRAL, PULSE-HEIGHT ANALYZER. UNLIKE THE ION CHAMBERS, THE TWO SCINTILLATION DETECTORS IN THE TWO SENSOR UNITS WERE NOT IDENTICAL. THE MORE SENSITIVE DETECTOR HAD A 1.27 CM-DIAMETER, 1 MM-THICK CRYSTAL COVERED BY A FLAT 0.25 MM-THICK BERYLLIUM WINDOW. THE LESS SENSITIVE DETECTOR (1.27 CM-DIAMETER, 1 MM-THICK CRYSTAL COVERED BY A FLAT 0.25 MM-THICK BERYLLIUM WINDOW) HAD A 6.35 MM-DIAMETER, 1 MM-THICK CRYSTAL AND A 2.03 MM-THICK BERYLLIUM DOME WINDOW IN ADDITION TO THE FLAT 0.25 MM WINDOW MOUNTED ON THE FACE OF THE CRYSTAL. BOTH ION CHAMBERS AND

SCINTILLATION DETECTORS WERE CAPABLE OF OBSERVATIONS WITH TIME RESOLUTIONS OF 2 S. THE AVERAGE DETECTION EFFICIENCIES FOR THE ION AND SCINTILLATION DETECTORS WERE OF THE ORDER OF 20 AND 60 PERCENT, RESPECTIVELY.

----- VELA 5A, KLEBESADEL-----

INVESTIGATION NAME- GAMMA-RAY ASTRONOMY

NSSDC ID- 69-046d-08

INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - R.W. KLEBESADEL LOS ALAMOS SCI LAB
OI - I.B. STRONG LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF SIX 10 CC CESIUM IODIDE SCINTILLATION COUNTERS DISTRIBUTED TO ACHIEVE NEARLY ISOTROPIC SENSITIVITY. INDIVIDUAL DETECTORS RESPONDED TO ENERGY DEPOSITIONS OF 0.2 TO 1.0 MEV WITH A DETECTION EFFICIENCY RANGING FROM 17 TO 50 PERCENT. THE SCINTILLATORS WERE SHIELDED AGAINST DIRECT PENETRATION BY ELECTRONS BELOW 0.75 MEV AND PROTONS BELOW 20 MEV. NO ACTIVE ANTICOINCIDENCE SHIELDING WAS PROVIDED. NORMALIZED OUTPUT PULSES FROM THE SIX DETECTORS WERE SUMMED INTO COUNTING AND LOGICS CIRCUITRY. LOGICAL SENSING OF RAPID, STATISTICALLY SIGNIFICANT COUNT RATE INCREASES INITIATED THE RECORDING OF DISCRETE COUNTS IN A SERIES OF LOGARITHMICALLY INCREASING TIME INTERVALS. THIS CAPABILITY PROVIDED CONTINUOUS TEMPORAL COVERAGE, WHICH, COUPLED WITH THE ISOTROPIC RESPONSE, IS UNIQUE IN ASTRONOMY. A TIME MEASUREMENT WAS ALSO ASSOCIATED WITH EACH RECORD. THE DATA ACCUMULATIONS INCLUDED A BACKGROUND COMPONENT DUE TO COSMIC PARTICLES AND THEIR SECONDARY EFFECTS. THE OBSERVED BACKGROUND RATE, WHICH WAS A FUNCTION OF THRESHOLD ENERGY, WAS ABOUT 150 COUNTS/S.

***** VELA 5B*****

SPACECRAFT COMMON NAME- VELA 5B

ALTERNATE NAMES- VELA 10 (TRW), 03955
VELA 5B (USAF)

NSSDC ID- 69-046E

LAUNCH DATE- 05/23/69 WEIGHT- 259. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- TITAN 3C

SPONSORING COUNTRY/AGENCY
UNITED STATES

DOD-USAF

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC EPOCH DATE- 05/25/69
ORBIT PERIOD- 6709. MIN INCLINATION- 32.8 DEG
PERIAPSIS- 110920. KM ALT APOAPSIS- 112283. KM ALT

PERSONNEL

MG - ARPA-STAFF ARPA/WASH, DC
PM - SAMSO USAF-LAS
PS - R.W. KLEBESADEL LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

VELA 5B WAS ONE OF TWO SPIN-STABILIZED, POLYHEDRAL SATELLITES THAT COMPRISED THE FIFTH LAUNCH IN THE VELA PROGRAM. THE ORBITS OF THE TWO SATELLITES ON EACH LAUNCH WERE BASICALLY CIRCULAR AT ABOUT 17 EARTH RADII, INCLINED AT 60 DEG TO THE ECLIPTIC, AND SPACED 180 DEG APART, THUS PROVIDING A MONITORING CAPABILITY OF OPPOSITE SIDES OF THE EARTH. THE OBJECTIVES OF THE SATELLITES WERE -- (1) TO STUDY SOLAR AND COSMIC X RAYS, EUV, SOLAR PROTONS, SOLAR WIND, AND NEUTRONS, (2) TO CARRY OUT RESEARCH AND DEVELOPMENT ON METHODS OF DETECTING NUCLEAR EXPLOSIONS BY MEANS OF SATELLITE-BORNE INSTRUMENTATION, AND (3) TO PROVIDE SOLAR FLARE DATA IN SUPPORT OF MANNED SPACE MISSIONS. VELA 5B, AN IMPROVED VERSION OF THE EARLIER VELA SERIES SATELLITES, HAD BETTER COMMAND CAPABILITIES, INCREASED DATA STORAGE, IMPROVED POWER REQUIREMENTS, BETTER THERMAL CONTROL OF OPTICAL SENSORS, AND GREATER EXPERIMENTATION WEIGHT. POWER SUPPLIES OF 120 W WERE PROVIDED BY 22,500 SOLAR CELLS MOUNTED ON 24 OF THE SPACECRAFT'S 26 FACES. A ROTATION RATE OF 78 RPM DURING TRANSFER ORBITS AND 1 RPM AFTER FINAL ORBIT INSERTION MAINTAINED NOMINAL ATTITUDE CONTROL. EIGHT WHIP ANTENNAS AND FOUR STUB ANTENNA ARRAYS AT OPPOSITE ENDS OF THE SPACECRAFT STRUCTURE WERE USED FOR GROUND COMMAND AND TELEMETRY.

----- VELA 5B, BAME-----

INVESTIGATION NAME- SOLAR WIND

NSSDC ID- 69-046E-05

INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - S.J. BAME LOS ALAMOS SCI LAB
OI - J.R. ASBRIDGE LOS ALAMOS SCI LAB
OI - H.E. FELTHAUSER LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

TWO ELECTROSTATIC ANALYZER-ELECTRON MULTIPLIER UNITS WERE USED TO STUDY THE INTERPLANETARY SOLAR WIND (INCLUDING HEAVY IONS) AND PROTONS AND ELECTRONS IN THE MAGNETOTAIL. ENERGY ANALYSIS WAS ACCOMPLISHED BY CHARGING THE PLATES TO KNOWN VOLTAGE LEVELS AND ALLOWING THEM TO DISCHARGE WITH KNOWN RESISTANCE CAPACITOR (RC) TIME CONSTANTS. PARTICLES IN A 6-DEG BY 100-DEG FAN-SHAPED ANGULAR RANGE WERE ACCEPTED FOR ANALYSIS DURING A DECAYING VOLTAGE CYCLE. THE 100-DEG DIMENSION WAS PARALLEL TO THE SPACECRAFT SPIN AXIS FOR BOTH DETECTORS. ONE DETECTOR UNIT WAS USED TO STUDY MAGNETOTAIL PROTONS OR ELECTRONS BETWEEN 20 EV AND 33 KEV AND SOLAR WIND HEAVY IONS IN THE ENERGY PER CHARGE RANGE BETWEEN 1 KEV/Q AND 8.3 KEV/Q. THE OTHER DETECTOR UNIT, WHICH FAILED, WAS DESIGNED TO STUDY SOLAR WIND ELECTRONS IN THE ENERGY RANGE FROM 7.5 EV TO 18.5 KEV AND SOLAR WIND POSITIVE IONS (MAINLY PROTONS AND ALPHA PARTICLES) IN AN ENERGY PER CHARGE RANGE FROM 120 EV/Q TO 5 KEV/Q.

----- VELA 5B, BAME-----

INVESTIGATION NAME- NEUTRON DETECTOR

NSSDC ID- 69-046E-07

INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - S.J. BAME LOS ALAMOS SCI LAB
OI - J.R. ASBRIDGE LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

THE NEUTRON DETECTOR CONSISTED OF A LARGE (ABOUT 3.6 KG) POLYETHYLENE MODERATOR SURROUNDING TWO HELIUM-3 FILLED PROPORTIONAL COUNTERS. NEUTRONS BETWEEN 1 AND 100 MEV WERE THERMALIZED BY THE MODERATOR AND DETECTED BY THE COUNTERS. THE INSTRUMENT WAS ALSO SENSITIVE TO PROTONS ABOVE 25 MEV.

----- VELA 5B, BELIAN-----

INVESTIGATION NAME- COSMIC X RAYS

NSSDC ID- 69-046E-06

INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

PI - R.D. BELIAN LOS ALAMOS SCI LAB
OI - W.D. EVANS LOS ALAMOS SCI LAB
OI - N.J. TERRELL NASA HEADQUARTERS

BRIEF DESCRIPTION

THE COSMIC X-RAY DETECTOR WAS A LARGE-AREA 26 SQ CM SODIUM IODIDE SCINTILLATOR WITH A 5-MIL BERYLLIUM WINDOW. THE EXPERIMENT WAS DESIGNED TO PROVIDE MEASUREMENTS OF THE LOCATION, INTENSITY, AND INTENSITY VARIATIONS OF NONSOLAR X-RAY SOURCES OVER A LONG PERIOD OF TIME. THE DETECTOR WAS SENSITIVE TO X-RAY PHOTONS IN TWO ENERGY INTERVALS (3 TO 6 KEV AND 3 TO 12 KEV), AND WAS SUFFICIENTLY SENSITIVE TO MONITOR FROM 6 TO 12 GALACTIC X-RAY SOURCES. ANY ONE SOURCE WAS VIEWED FOR APPROXIMATELY 1 H, AND EVERY 2 DAYS EACH SOURCE WAS BACK IN VIEW. THREE MODES OF READOUT WERE AVAILABLE -- (1) THE REAL TIME NORMAL MODE, IN WHICH COUNTS FROM EACH ENERGY CHANNEL WERE TRANSMITTED EVERY S, (2) THE HIGH RESOLUTION MODE, IN WHICH ONLY THE 3- TO 12-KEV CHANNEL WAS TRANSMITTED EIGHT TIMES PER S, AND (3) THE STORE MODE, IN WHICH ONLY THE 3- TO 12-KEV CHANNEL WAS STORED.

----- VELA 5B, HIGBIE-----

INVESTIGATION NAME- SOLAR PARTICLE TELESCOPES

NSSDC ID- 69-046E-03

INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - P.R. HIGBIE LOS ALAMOS SCI LAB
OI - R.D. BELIAN LOS ALAMOS SCI LAB
OI - D.N. BAKER LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

THE SOLAR TELESCOPE EXPERIMENT WAS DESIGNED TO MEASURE THE ENERGY SPECTRUM AND ANGULAR DISTRIBUTION OF SOLAR PROTONS BETWEEN 0.3 AND 50 MEV AND OF SOLAR ALPHA PARTICLES BETWEEN 2 AND 100 MEV. IN ADDITION, THE EXPERIMENT WAS DESIGNED TO IDENTIFY AND MONITOR THE FLUX OF DEUTERIUM, TRITIUM, AND HELIUM-3 NUCLEI WHICH MAY BE EMITTED DURING A SOLAR PARTICLE FLARE AND TO MONITOR THE INTENSITY OF MORE HEAVILY IONIZED PARTICLES. THERE WERE THREE TELESCOPES IN A SINGLE PLANE, ORIENTED AT ANGLES OF 45 DEG, 90 DEG, AND 135 DEG RELATIVE TO THE SPACECRAFT SPIN AXIS. EACH INSTRUMENT CONSISTED OF A COLLIMATING TUBE (PROVIDING AN ANGULAR VIEW OF 30 DEG) IN FRONT

OF A SOLID-STATE DE/DX VS E PARTICLE DETECTOR.

----- VELA 5B, HIGBIE-----

INVESTIGATION NAME- ELECTRON DETECTORS

NSSDC ID- 69-046E-04

INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - P.R. HIGBIE	LOS ALAMOS SCI LAB
OI - R.D. BELIAN	LOS ALAMOS SCI LAB
OI - D.N. BAKER	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

TWO SETS OF THREE SOLID-STATE ELECTRON DETECTORS IN A TELESCOPIC ARRANGEMENT WITH AN ANGULAR VIEW OF 30 DEG WERE USED TO OBSERVE ELECTRONS OVER THE RANGE 30 TO 150 KEV. PROTONS OF ENERGY LESS THAN 300 KEV AND GREATER THAN 50 MEV COULD ALSO BE DETECTED. ONE SET OF DETECTORS VIEWED THE PARTICLES DIRECTLY. THE OTHER UTILIZED A SCATTER GEOMETRY TO IMPROVE ABILITY TO OBSERVE ELECTRONS IN THE PRESENCE OF MUCH LARGER FLUXES OF PROTONS. EACH OF THE THREE DIRECT VIEW DETECTORS AND EACH OF THE THREE SCATTER GEOMETRY DETECTORS LAY IN A SINGLE PLANE AND MADE ANGLES OF 45 DEG, 90 DEG, AND 135 DEG WITH THE SPACECRAFT SPIN AXIS.

----- VELA 5B, KLEBESADEL-----

INVESTIGATION NAME- GAMMA RAY ASTRONOMY

NSSDC ID- 69-046E-08

INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - R.W. KLEBESADEL	LOS ALAMOS SCI LAB
OI - I.B. STRONG	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF SIX 10 CC CM CESIUM IODIDE SCINTILLATION COUNTERS DISTRIBUTED TO ACHIEVE NEARLY ISOTROPIC SENSITIVITY. INDIVIDUAL DETECTORS RESPONDED TO ENERGY DEPOSITIONS OF 0.2 TO 1.0 MEV WITH A DETECTION EFFICIENCY RANGING FROM 17 TO 50 PERCENT. THE SCINTILLATORS WERE SHIELDED AGAINST DIRECT PENETRATION BY ELECTRONS BELOW 0.75 MEV AND PROTONS BELOW 20 MEV. NO ACTIVE ANTICOINCIDENCE SHIELDING WAS PROVIDED. NORMALIZED OUTPUT PULSES FROM THE SIX DETECTORS WERE SUMMED INTO COUNTING AND LOGICS CIRCUITRY. LOGICAL SENSING OF RAPID, STATISTICALLY SIGNIFICANT COUNT RATE INCREASES INITIATED THE RECORDING OF DISCRETE COUNTS IN A SERIES OF LOGARITHMICALLY INCREASING TIME INTERVALS. THIS CAPABILITY PROVIDED CONTINUOUS TEMPORAL COVERAGE, WHICH, COUPLED WITH THE ISOTROPIC RESPONSE, IS UNIQUE IN ASTRONOMY. A TIME MEASUREMENT WAS ALSO ASSOCIATED WITH EACH RECORD. THE DATA ACCUMULATIONS INCLUDED A BACKGROUND COMPONENT, DUE TO COSMIC PARTICLES AND THEIR SECONDARY EFFECTS. THE OBSERVED BACKGROUND RATE, WHICH WAS A FUNCTION OF THRESHOLD ENERGY, WAS ABOUT 150 COUNTS/S.

***** VELA 6A*****

SPACECRAFT COMMON NAME- VELA 6A
ALTERNATE NAMES- PL-702B, VELA 11 (TRW)
04366

NSSDC ID- 70-027A

LAUNCH DATE- 04/08/70 WEIGHT- 261. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 6729. MIN
PERIAPSIS- 111210. KM ALT

EPOCH DATE- 04/09/70
INCLINATION- 32.41 DEG
APOAPSIS- 112160. KM ALT

PERSONNEL

MG - ARPA-STAFF	ARPA/WASH, DC
PM - SANSO	USAF-LAS
PS - R.W. KLEBESADEL	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

VELA 6A WAS ONE OF TWO SPIN-STABILIZED, POLYHEDRAL SATELLITES THAT COMPRISED THE SIXTH LAUNCH IN THE VELA PROGRAM. THE ORBITS OF THE TWO SATELLITES ON EACH LAUNCH WERE BASICALLY CIRCULAR AT ABOUT 17 EARTH RADII, INCLINED AT 60 DEG TO THE ECLIPTIC, AND SPACED 180 DEG APART, THUS PROVIDING A MONITORING CAPABILITY OF OPPOSITE SIDES OF THE EARTH. THE OBJECTIVES OF THE SATELLITES WERE (1) TO STUDY SOLAR AND COSMIC X RAYS, EUV, SOLAR PROTONS, SOLAR WIND, AND NEUTRONS, (2) TO CARRY OUT RESEARCH AND DEVELOPMENT ON METHODS OF DETECTING NUCLEAR EXPLOSIONS BY MEANS OF SATELLITE-BORNE INSTRUMENTATION, AND (3) TO PROVIDE SOLAR FLARE DATA IN SUPPORT OF MANNED SPACE MISSIONS. VELA 6A WAS AN IMPROVED VERSION OF THE EARLIER VELA

SERIES SATELLITES HAVING BETTER COMMAND CAPABILITIES, INCREASED DATA STORAGE, IMPROVED POWER REQUIREMENTS, BETTER THERMAL CONTROL OF OPTICAL SENSORS, AND GREATER EXPERIMENTATION WEIGHT. POWER SUPPLIES OF 120 W WERE PROVIDED BY 22-500 SOLAR CELLS MOUNTED ON 24 OF THE SPACECRAFT'S 26 FACES. ROTATION RATES OF 78 RPM DURING TRANSFER ORBITS AND 1 RPM AFTER FINAL ORBIT INSERTION MAINTAINED NOMINAL ATTITUDE CONTROL. EIGHT WHIP ANTENNAS AND FOUR STUB ANTENNA ARRAYS AT OPPOSITE ENDS OF THE SPACECRAFT STRUCTURE WERE USED FOR GROUND COMMANDS AND TELEMETRY. THE LAUNCH OF VELA 6A AND 6B, PLUS THE TWO ACTIVE VELAS STILL IN ORBIT (VELA 5A AND 5B), COMPLETED THE OBJECTIVES OF THE VELA PROGRAM.

----- VELA 6A, BAME-----

INVESTIGATION NAME- SOLAR WIND EXPERIMENT

NSSDC ID- 70-027A-05

INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - S.J. BAME	LOS ALAMOS SCI LAB
OI - J.R. ASBRIDGE	LOS ALAMOS SCI LAB
OI - H.E. FELTHAUSER	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

TWO ELECTROSTATIC ANALYZER-ELECTRON MULTIPLIER UNITS WERE USED TO STUDY THE INTERPLANETARY SOLAR WIND (INCLUDING HEAVY IONS) AND PROTONS AND ELECTRONS IN THE MAGNETOTAIL. ENERGY ANALYSIS WAS ACCOMPLISHED BY CHARGING THE PLATES TO KNOWN VOLTAGE LEVELS ALLOWING THEM TO DISCHARGE WITH KNOWN RESISTANCE CAPACITOR (RC) TIME CONSTANTS. PARTICLES IN A 6-DEG BY 100-DEG FAN-SHAPED ANGULAR RANGE WERE ACCEPTED FOR ANALYSIS DURING A DECAYING VOLTAGE CYCLE. THE 100-DEG DIMENSION WAS PARALLEL TO THE SPACECRAFT SPIN AXIS FOR BOTH DETECTORS. ONE ANALYZER-MULTIPLIER UNIT STUDIED SOLAR WIND ELECTRONS IN THE ENERGY RANGE FROM 7.5 EV TO 18.5 KEV AND SOLAR WIND POSITIVE IONS (MAINLY PROTONS AND ALPHA PARTICLES) IN AN ENERGY PER CHARGE RANGE FROM 120 EV/Q TO 5 KEV/Q. THE OTHER UNIT STUDIED MAGNETOTAIL PROTONS OR ELECTRONS BETWEEN 20 EV AND 33 KEV AND SOLAR WIND HEAVY IONS IN THE ENERGY PER CHARGE RANGE BETWEEN 1 KEV/Q AND 8.3 KEV/Q.

----- VELA 6A, BAME-----

INVESTIGATION NAME- NEUTRON DETECTOR

NSSDC ID- 70-027A-07

INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - S.J. BAME	LOS ALAMOS SCI LAB
OI - J.R. ASBRIDGE	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

THE NEUTRON DETECTOR CONSISTED OF A LARGE (ABOUT 3.6 KG) POLYETHYLENE MODERATOR SURROUNDING TWO HELIUM-3 FILLED PROPORTIONAL COUNTERS. NEUTRONS BETWEEN 1 AND 100 MEV WERE THERMALIZED BY THE MODERATOR AND DETECTED BY THE COUNTERS. THE INSTRUMENT WAS ALSO SENSITIVE TO PROTONS ABOVE 25 MEV.

----- VELA 6A, CHAMBERS-----

INVESTIGATION NAME- SOLAR X-RAY DETECTORS, 0.5 TO 3.0A, 1 TO 8A, 1 TO 16A, 44 TO 60A

NSSDC ID- 70-027A-02

INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
SOLAR PHYSICS

PERSONNEL

PI - W.H. CHAMBERS	LOS ALAMOS SCI LAB
OI - J.C. FULLER	LOS ALAMOS SCI LAB
OI - W.E. KUNZ	LOS ALAMOS SCI LAB
OI - P.E. FEHLAU	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO MONITOR THE SOLAR AMBIENT AND FLARE-PRODUCED FLUX OF X RAYS IN THE 0.3- TO 60-A WAVELENGTH REGION. TWO IDENTICAL X-RAY SENSOR UNITS WERE MOUNTED AT DIAMETRICALLY OPPOSED APEX POSITIONS ON THE SATELLITE. EACH UNIT CONTAINED FOUR DETECTORS -- THREE ION CHAMBERS AND A SCINTILLATION (NaI(TL)) DETECTOR. AS EACH ION CHAMBER HAD A HEMISPHERICAL WINDOW, THE COMBINED OUTPUT SIGNALS FROM IDENTICAL CHAMBERS IN EACH SENSOR UNIT APPROXIMATED THE RESPONSE OF AN IDEAL DETECTOR WITH A 4-PI STERADIAN FIELD OF VIEW. THE ION CHAMBERS HAD THE FOLLOWING WINDOW MATERIALS, GAS FILLS, AND WAVELENGTH RESPONSES. CHAMBER 1 -- 0.127 MM OF BERYLLIUM, 0.9 ATM OF ARGON + 0.1 ATM OF HELIUM, 1 TO 8 A. CHAMBER 2 -- 6.35 MICROMETER OF MYLAR OVERCOATED WITH ABOUT AN 8,500 A LAYER OF ALUMINUM, 0.5 ATM OF NITROGEN, 1 TO 16 A. CHAMBER 3 -- 6.35 MICROMETER OF MYLAR, 0.5 ATM OF NITROGEN, 1 TO 16 A AND 44 TO 60 A. THIS COMBINATION OF ION CHAMBERS ALLOWED SOLAR X-RAY FLUX MEASUREMENTS IN THE BANDS 1 TO 8 A, 1

TO 16 A, 8 TO 16 A, AND 44 TO 60 A TO BE OBTAINED UPON SUITABLE ANALYSIS OF THE DATA. THE SCINTILLATION DETECTOR USED FOR THE 0.3- TO 3-A WAVELENGTH REGION CONSISTED OF A THALLIUM-ACTIVATED NAI CRYSTAL OPTICALLY COUPLED TO A PMT, THE OUTPUT OF WHICH FED A FIVE-LEVEL, INTEGRAL, PULSE-HEIGHT ANALYZER. UNLIKE THE ION CHAMBERS, THE TWO SCINTILLATION DETECTORS IN THE TWO SENSOR UNITS WERE NOT IDENTICAL. THE MORE SENSITIVE DETECTOR HAD A 1.27 CM-DIAMETER, 1 MM-THICK CRYSTAL COVERED BY A FLAT 0.25 MM-THICK BERYLLIUM WINDOW. THE LESS SENSITIVE DETECTOR (1.E-9 J/54 CM-S) HAD A 6.35 MM-DIAMETER, 1 MM-THICK CRYSTAL AND A 2.03 MM-THICK BERYLLIUM DOME WINDOW IN ADDITION TO THE FLAT 0.25 MM WINDOW MOUNTED ON THE FACE OF THE CRYSTAL. BOTH ION CHAMBERS AND SCINTILLATION DETECTORS WERE CAPABLE OF OBSERVATIONS WITH TIME RESOLUTIONS OF 2 S. THE AVERAGE DETECTION EFFICIENCIES FOR THE ION AND SCINTILLATION DETECTORS WERE OF THE ORDER OF 20 AND 60 PERCENT, RESPECTIVELY.

----- VELA 6A, HIGBIE-----

INVESTIGATION NAME- SOLAR PARTICLE TELESCOPES

NSSDC ID- 70-027A-03

INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - P.R. HIGBIE	LOS ALAMOS SCI LAB
OI - R.D. BELIAN	LOS ALAMOS SCI LAB
OI - D.N. BAKER	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

THE SOLAR TELESCOPE EXPERIMENT WAS DESIGNED TO MEASURE THE ENERGY SPECTRUM AND ANGULAR DISTRIBUTION OF SOLAR PROTONS BETWEEN 0.3 AND 50 MEV AND OF SOLAR ALPHA PARTICLES BETWEEN 2 AND 100 MEV. IN ADDITION, THE EXPERIMENT WAS DESIGNED TO IDENTIFY AND MONITOR THE FLUX OF DEUTERIUM, TRITIUM, AND HELIUM-3 NUCLEI WHICH MAY BE EMITTED DURING A SOLAR PARTICLE FLARE AND TO MONITOR THE INTENSITY OF MORE HEAVILY IONIZED PARTICLES. THERE WERE THREE TELESCOPES IN A SINGLE PLANE, ORIENTED AT ANGLES OF 45 DEG, 90 DEG, AND 135 DEG RELATIVE TO THE SPACECRAFT SPIN AXIS. EACH INSTRUMENT CONSISTED OF A COLLIMATING TUBE (PROVIDING AN ANGULAR VIEW OF 30 DEG) IN FRONT OF A SOLID-STATE DE/DX VS E PARTICLE DETECTOR.

----- VELA 6A, HIGBIE-----

INVESTIGATION NAME- ELECTRON DETECTORS

NSSDC ID- 70-027A-04

INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - P.R. HIGBIE	LOS ALAMOS SCI LAB
OI - R.D. BELIAN	LOS ALAMOS SCI LAB
OI - D.N. BAKER	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

TWO SETS OF THREE SOLID-STATE ELECTRON DETECTORS IN A TELESCOPIC ARRANGEMENT WITH AN ANGULAR VIEW OF 30 DEG WERE USED TO OBSERVE ELECTRONS OVER THE RANGE 30 TO 150 KEV. PROTONS OF ENERGY LESS THAN 300 KEV AND GREATER THAN 50 MEV COULD ALSO BE DETECTED. ONE SET OF DETECTORS VIEWED THE PARTICLES DIRECTLY. THE OTHER UTILIZED A SCATTER GEOMETRY TO IMPROVE ITS ABILITY TO OBSERVE ELECTRONS IN THE PRESENCE OF MUCH LARGER FLUXES OF PROTONS. EACH OF THE THREE DIRECT-VIEW DETECTORS AND EACH OF THE THREE SCATTER GEOMETRY DETECTORS LAID IN A SINGLE PLANE AND MADE ANGLES OF 45 DEG, 90 DEG, AND 135 DEG WITH THE SPACECRAFT SPIN AXIS.

----- VELA 6A, KLEBSADEL-----

INVESTIGATION NAME- GAMMA-RAY ASTRONOMY

NSSDC ID- 70-027A-08

INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - R.W. KLEBSADEL	LOS ALAMOS SCI LAB
OI - I.B. STRONG	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF SIX 10 CC CESIUM IODIDE SCINTILLATION COUNTERS DISTRIBUTED TO ACHIEVE NEARLY ISOTROPIC SENSITIVITY. INDIVIDUAL DETECTORS RESPONDED TO ENERGY DEPOSITIONS OF 0.3 TO 1.5 MEV WITH A DETECTION EFFICIENCY RANGING FROM 17 TO 50 PERCENT. THE SCINTILLATORS WERE SHIELDED AGAINST DIRECT PENETRATION BY ELECTRONS BELOW 0.75 MEV AND PROTONS BELOW 20 MEV. NO ACTIVE ANTICOINCIDENCE SHIELDING WAS PROVIDED. NORMALIZED OUTPUT PULSES FROM THE SIX DETECTORS WERE SUMMED INTO COUNTING AND LOGICS CIRCUITRY. LOGICAL SENSING OF RAPID, STATISTICALLY SIGNIFICANT COUNT RATE INCREASES INITIATED THE RECORDING OF DISCRETE COUNTS IN A SERIES OF LOGARITHMICALLY INCREASING TIME INTERVALS. THIS CAPABILITY PROVIDED CONTINUOUS TEMPORAL COVERAGE WHICH, COUPLED WITH THE ISOTROPIC RESPONSE,

WAS UNIQUE IN ASTRONOMY. A TIME MEASUREMENT WAS ALSO ASSOCIATED WITH EACH RECORD. THE DATA ACCUMULATIONS INCLUDED A BACKGROUND COMPONENT, DUE TO COSMIC PARTICLES AND THEIR SECONDARY EFFECTS. THE OBSERVED BACKGROUND RATE, WHICH WAS A FUNCTION OF THRESHOLD ENERGY, WAS ABOUT 20 COUNTS/S.

***** VELA 6B*****

SPACECRAFT COMMON NAME- VELA 6B
ALTERNATE NAMES- PL-702C, VELA 12 (TRW)
04368, VELA 6B (USAF)

NSSDC ID- 70-027B

LAUNCH DATE- 04/08/70

WEIGHT- 261. KG

LAUNCH SITE- CAPE CANAVERAL, UNITED STATES

LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES

DOD-USAF

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 6745. MIN
PERIAPSIS- 111500. KM ALT

EPOCH DATE- 04/11/70
INCLINATION- 32.52 DEG
APOAPSIS- 112210. KM ALT

PERSONNEL

MG - ARPA-STAFF	ARPA/WASH, DC
PM - SAMSO	USAF-LAS
PS - R.W. KLEBSADEL	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

VELA 6B WAS ONE OF TWO SPIN-STABILIZED, POLYHEDRAL SATELLITES THAT COMPRISED THE SIXTH LAUNCH IN THE VELA PROGRAM. THE ORBITS OF THE TWO SATELLITES ON EACH LAUNCH WERE BASICALLY CIRCULAR AT ABOUT 17 EARTH RADII, INCLINED AT 60 DEG TO THE ECLIPTIC, AND SPACED 180 DEG APART, THUS PROVIDING A MONITORING CAPABILITY OF OPPOSITE SIDES OF THE EARTH. THE OBJECTIVES OF THE SATELLITES WERE (1) TO STUDY SOLAR AND COSMIC X RAYS, EUV, SOLAR PROTONS, SOLAR WIND, AND NEUTRONS, (2) TO CARRY OUT RESEARCH AND DEVELOPMENT ON METHODS OF DETECTING NUCLEAR EXPLOSIONS BY MEANS OF SATELLITE-BORNE INSTRUMENTATION, AND (3) TO PROVIDE SOLAR FLARE DATA IN SUPPORT OF MANNED SPACE MISSIONS. VELA 6B WAS AN IMPROVED VERSION OF THE EARLIER VELA SERIES SATELLITES HAVING BETTER COMMAND CAPABILITIES, INCREASED DATA STORAGE, IMPROVED POWER REQUIREMENTS, BETTER THERMAL CONTROL OF OPTICAL SENSORS, AND GREATER EXPERIMENTATION WEIGHT. POWER SUPPLIES OF 120 W WERE PROVIDED BY 22,500 SOLAR CELLS MOUNTED ON 24 OF THE SPACECRAFT'S 26 FACES. A ROTATION RATE OF 78 RPM DURING TRANSFER ORBITS AND 1 RPM AFTER FINAL ORBIT INSERTION MAINTAINED NOMINAL ATTITUDE CONTROL. EIGHT WHIP ANTENNAS AND FOUR STUB ANTENNA ARRAYS AT OPPOSITE ENDS OF THE SPACECRAFT STRUCTURE WERE USED FOR GROUND COMMANDS AND TELEMETRY. THE LAUNCH OF VELA 6A AND 6B, PLUS THE TWO ACTIVE VELAS STILL IN ORBIT (VELA 5A AND B), COMPLETED THE OBJECTIVES OF THE VELA PROGRAM.

----- VELA 6B, BAME-----

INVESTIGATION NAME- NEUTRON DETECTOR

NSSDC ID- 70-027B-07

INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - S.J. BAME	LOS ALAMOS SCI LAB
OI - J.R. ASBRIDGE	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

THE NEUTRON DETECTOR CONSISTED OF A LARGE (ABOUT 3.6 KG) POLYETHYLENE MODERATOR SURROUNDING TWO HELIUM-3 FILLED PROPORTIONAL COUNTERS. NEUTRONS BETWEEN 1 AND 100 MEV WERE THERMALIZED BY THE MODERATOR AND DETECTED BY THE COUNTERS. THE INSTRUMENT WAS ALSO SENSITIVE TO PROTONS ABOVE 25 MEV.

----- VELA 6B, HIGBIE-----

INVESTIGATION NAME- SOLAR PARTICLE TELESCOPES

NSSDC ID- 70-027B-03

INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - P.R. HIGBIE	LOS ALAMOS SCI LAB
OI - R.D. BELIAN	LOS ALAMOS SCI LAB
OI - D.N. BAKER	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

THE SOLAR TELESCOPE EXPERIMENT WAS DESIGNED TO MEASURE THE ENERGY SPECTRUM AND ANGULAR DISTRIBUTION OF SOLAR PROTONS BETWEEN 0.3 AND 50 MEV AND OF SOLAR ALPHA PARTICLES BETWEEN 2 AND 100 MEV. IN ADDITION, THE EXPERIMENT WAS DESIGNED TO IDENTIFY AND MONITOR THE FLUX OF DEUTERIUM, TRITIUM, AND HELIUM-3 NUCLEI WHICH MAY BE EMITTED DURING A SOLAR PARTICLE FLARE AND TO MONITOR THE INTENSITY OF MORE HEAVILY IONIZED PARTICLES. THERE WERE THREE TELESCOPES IN A SINGLE PLANE, ORIENTED AT ANGLES OF 45 DEG, 90 DEG, AND 135 DEG RELATIVE TO

THE SPACECRAFT SPIN AXIS. EACH INSTRUMENT CONSISTED OF A COLLIMATING TUBE (PROVIDING AN ANGULAR VIEW OF 30 DEG) IN FRONT OF A SOLID-STATE DE/DX VS E PARTICLE DETECTOR.

----- VELA 6B, HIGBIE-----

INVESTIGATION NAME- ELECTRON DETECTORS

NSSDC ID- 70-027B-04

INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - P.R. HIGBIE	LOS ALAMOS SCI LAB
OI - R.D. BELIAN	LOS ALAMOS SCI LAB
OI - D.N. BAKER	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

TWO SETS OF THREE SOLID-STATE ELECTRON DETECTORS IN A TELESCOPIC ARRANGEMENT WITH AN ANGULAR VIEW OF 30 DEG WERE USED TO OBSERVE ELECTRONS OVER THE RANGE 30 TO 150 KEV. PROTONS OF ENERGY LESS THAN 300 KEV AND GREATER THAN 50 MEV COULD ALSO BE DETECTED. ONE SET OF DETECTORS VIEWED THE PARTICLES DIRECTLY. THE OTHER UTILIZED A SCATTER GEOMETRY TO IMPROVE ITS ABILITY TO OBSERVE ELECTRONS IN THE PRESENCE OF MUCH LARGER FLUXES OF PROTONS. EACH OF THE THREE DIRECT-VIEW DETECTORS AND EACH OF THE THREE SCATTER GEOMETRY DETECTORS LAID IN A SINGLE PLANE AND MADE ANGLES OF 45 DEG, 90 DEG, AND 135 DEG WITH THE SPACECRAFT SPIN AXIS.

***** VIKING 1 LANDER*****

SPACECRAFT COMMON NAME- VIKING 1 LANDER
ALTERNATE NAMES- VIKING-B LANDER

NSSDC ID- 75-075C

LAUNCH DATE- 08/20/75
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

WEIGHT- 605. KG

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- MARS LANDER

PERSONNEL

MG - W. JAKOBOWSKI	NASA HEADQUARTERS
SC - R.S. YOUNG	NASA HEADQUARTERS
PM - K.S. WATKINS	NASA-JPL
PS - C.W. SNYDER	NASA-JPL

BRIEF DESCRIPTION

THIS SPACECRAFT WAS THE LANDING VEHICLE FOR THE TWO-PART SPACECRAFT MISSION. IT SOFT-LANDED ON JULY 20, 1976, IN THE CHRYSIE REGION OF MARS AT 22.27 DEG N LATITUDE AND 47.94 DEG W LONGITUDE. THE LANDER CARRIED INSTRUMENTS TO STUDY THE BIOLOGY, CHEMICAL COMPOSITION (ORGANIC AND INORGANIC), METEOROLOGY, SEISMOLOGY, MAGNETIC PROPERTIES, SURFACE APPEARANCE, AND PHYSICAL PROPERTIES OF THE MARTIAN SURFACE AND ATMOSPHERE. THE LANDER HAD A 70-W POWER CAPACITY AND A SCIENTIFIC PAYLOAD OF APPROXIMATELY 91 KG (200 LB). SOME OF THE DATA COLLECTED WERE RETURNED BY DIRECT RADIO LINK TO EARTH, BUT MOST OF THE DATA WERE RETURNED BY RELAY THROUGH ONE OF THE ORBITERS. THE LANDER WAS APPROXIMATELY 3M ACROSS AND ABOUT 2M HIGH.

----- VIKING 1 LANDER, HESS-----

INVESTIGATION NAME- METEOROLOGY

NSSDC ID- 75-075C-07

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

TL - S.L. HESS	FLORIDA STATE U
TM - C.B. LEVY	U OF WASHINGTON
TM - R.M. HENRY	U OF WASHINGTON
TM - J.A. RYAN	CALIF ST U, FULLERTON
TM - J.E. TILLMAN	U OF WASHINGTON

BRIEF DESCRIPTION

THIS EXPERIMENT ANALYZED THE METEOROLOGICAL ENVIRONMENT NEAR THE PLANETARY SURFACE AND OBTAINED INFORMATION ABOUT MOTION SYSTEMS OF VARIOUS SCALES. THE ATMOSPHERIC PARAMETERS DETERMINED WERE PRESSURE, TEMPERATURE, WIND SPEED, AND WIND DIRECTION. DIURNAL AND SEASONAL VARIATIONS WERE OF PARTICULAR IMPORTANCE. THE SAMPLING RATES AND DURATIONS FOR ANY ONE MARTIAN DAY (SOL) WERE SELECTABLE BY GROUND COMMAND. THE SENSORS WERE MOUNTED ON AN ERECTED BOOM. THREE HOT-FILM ANEMOMETERS, THROUGH WHICH AN ELECTRIC CURRENT WAS PASSED TO HEAT TWO GLASS NEEDLES COATED WITH PLATINUM AND OVERCOATED WITH ALUMINUM OXIDE, WERE USED TO MEASURE WIND SPEED. THE ELECTRIC POWER NEEDED TO MAINTAIN THESE SENSORS AT A FIXED TEMPERATURE ABOVE THE SURROUNDING AIR WAS THE MEASURE OF WIND SPEED.

ATMOSPHERIC TEMPERATURE WAS MEASURED BY THREE FINE-WIRE THERMOCOUPLES IN PARALLEL. A THIN METAL DIAPHRAGM, MOUNTED IN A VACUUM-SEALED CASE, WAS USED TO MEASURE ATMOSPHERIC PRESSURE.

----- VIKING 1 LANDER, MICHAEL, JR.-----

INVESTIGATION NAME- LANDER RADIO SCIENCE

NSSDC ID- 75-075C-11

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
IONOSPHERES
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL

TL - W.H. MICHAEL, JR.	NASA-LARC
TM - I.I. SHAPIRO	MASS INST OF TECH
TM - G.F. LINDAL	NASA-JPL
TM - J.G. DAVIES	U OF MANCHESTER
TM - D.L. CAIN	NASA-JPL
TM - M.D. GROSSI	RAYTHEON CORP
TM - G.L. TYLER	STANFORD U
TM - J.P. BRENNKE	NASA-JPL
TM - R.H. TOLSON	NASA-LARC
TM - C.T. STELZRIED	NASA-JPL
TM - G. BORN	NASA-JPL
TM - R. REASENBERG	MASS INST OF TECH

BRIEF DESCRIPTION

THIS EXPERIMENT USED THE LANDER S-BAND RADIO TRANSMITTER TO ACQUIRE DOPPLER AND RANGE FOR THE LANDER, UTILIZING THE SAME DEEP SPACE NETWORK FACILITIES THAT WERE USED BY THE ORBITERS. THE RESULTING DATA WERE USED TO DETERMINE THE LOCATION OF THE LANDER ON THE PLANET'S SURFACE. THEY ALSO PROVIDED MORE PRECISE INFORMATION ABOUT THE ORBITAL, ROTATIONAL, AND PRECESSIONAL MOTION OF MARS THAN HAD PREVIOUSLY BEEN AVAILABLE. THE TWO PRINCIPAL DIFFERENCES BETWEEN ORBITER AND LANDER TRACKING DATA ARE: (1) LANDER TRACKING PERIODS ARE NEVER LONGER THAN 2 H AND ARE SOMETIMES MUCH SHORTER BECAUSE OF THERMAL CONSTRAINTS ON THE DURATION OF LANDER TRANSMITTER OPERATION, AND (2) LANDERS HAVE NO X-BAND SIGNALS TO PROVIDE THE CORRECTIONS TO RANGE DATA FOR THE INTERPLANETARY PLASMA EFFECTS. CONSEQUENTLY, LANDER RANGING SESSIONS WERE SCHEDULED TO BE NEARLY SIMULTANEOUS WITH ORBITER RANGING WHENEVER POSSIBLE, SO THAT THE ORBITER S- AND X-BAND DATA COULD SUPPLY THESE CORRECTIONS.

----- VIKING 1 LANDER, MUTCH-----

INVESTIGATION NAME- LANDER IMAGING

NSSDC ID- 75-075C-06

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
METEOROLOGY
PLANETOLOGY

PERSONNEL

TL - T.A. MUTCH	NASA HEADQUARTERS
TM - C. SAGAN	CORNELL U
TM - A.B. BINDER	SCIENCE APPL, INC
TM - E.C. MORRIS	US GEOLOGICAL SURVEY
TM - F.O. HUCK	NASA-LARC
TM - E.C. LEVINthal	STANFORD U
TM - S. LIEBES, JR.	STANFORD U
TM - J.B. POLLACK	NASA-ARC
TM - R.E. ARVIDSON	WASHINGTON U

BRIEF DESCRIPTION

THE LANDER IMAGING EXPERIMENT VIEWED THE SCENE SURROUNDING THE LANDER, THE SURFACE SAMPLER AND OTHER PARTS OF THE LANDER, THE SUN, PHOBOS, AND DEIMOS TO PROVIDE DATA FOR OPERATIONAL PURPOSES AND FOR GEOLOGICAL AND METEOROLOGICAL INVESTIGATIONS. TWO SCANNING CAMERAS, CAPABLE OF RESOLVING 0.04 DEG (HIGH RESOLUTION) OR 0.12 DEG (LOW RESOLUTION, COLOR, AND IR) WERE USED ON EACH LANDER. EACH IMAGE ACQUIRED COVERED A VERTICAL FIELD OF 20 DEG (HIGH RESOLUTION) OR 60 DEG (LOW RESOLUTION, COLOR, AND IR) AND A HORIZONTAL FIELD THAT WAS COMMANDABLE FROM 2.5 DEG TO 342.5 DEG IN 2.5-DEG INCREMENTS. IMAGES WERE ACQUIRED FROM 40 DEG ABOVE THE NOMINAL HORIZON TO 60 DEG BELOW, AND WERE COMMANDABLE IN 10-DEG INCREMENTS. THE CAMERAS WERE MOUNTED 1.3 M ABOVE THE NOMINAL LANDING PLANE AND WERE CAPABLE OF VIEWING TWO FOOTPADS AND MOST OF THE AREA ACCESSIBLE TO THE SURFACE SAMPLER. THE TWO CAMERAS WERE SEPARATED BY 0.8 M, AND STEREOSCOPIC PICTURES WERE OBTAINED OVER MOST OF THE SCENE. BLACK AND WHITE IMAGES IN EITHER LOW OR HIGH RESOLUTION INCLUDED RADIATION WAVELENGTHS FROM 0.4 TO 1.1 MICROMETERS. THE USE OF A SINGLE DETECTOR TO IMAGE AN ENTIRE FRAME ALLOWED A RELATIVE RADIOMETRIC ACCURACY OF PLUS OR MINUS 10 PERCENT. FOR MORE INFORMATION CONCERNING THE CAMERAS, SEE HUCK ET AL., 'SPACE SCIENCE INSTRUMENTATION 1,' 189-241 (1975).

----- VIKING 1 LANDER, TOULMIN, 3RD-----

INVESTIGATION NAME- INORGANIC ANALYSIS

NSSDC ID- 75-D75C-13

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY

PERSONNEL

TL - P. TOULMIN, 3RD	US GEOLOGICAL SURVEY
TM - A.K. BAIRD	POMONA COLLEGE
TM - K. KEIL	U OF NEW MEXICO
TM - H.J. ROSE	US GEOLOGICAL SURVEY
TM - B.C. CLARK	MARTIN-MARIETTA AEROSP

BRIEF DESCRIPTION

THIS EXPERIMENT UTILIZED AN ENERGY-DISPERSIVE X-RAY FLUORESCENCE SPECTROMETER (XRF) IN WHICH FOUR SEALED, GAS-FILLED PROPORTIONAL COUNTERS (PC'S) DETECTED X-RAYS EMITTED FROM SAMPLES OF MARTIAN SURFACE MATERIALS IRRADIATED BY X-RAYS FROM RADIOISOTOPE SOURCES (IRON-55 AND CADMIUM-109). THE OUTPUT OF THE PROPORTIONAL COUNTERS WAS SUBJECTED TO PULSE HEIGHT ANALYSIS BY AN ONBOARD STEP-SCANNING, SINGLE-CHANNEL ANALYZER WITH ADJUSTABLE COUNTING PERIODS. THIS INSTRUMENT WAS LOCATED INSIDE THE LANDER BODY, AND SAMPLES WERE DELIVERED TO IT BY THE LANDER SURFACE SAMPLER. CALIBRATION STANDARDS WERE AN INTEGRAL PART OF THE INSTRUMENT. RECONSTRUCTED SPECTRA YIELDED SURFACE COMPOSITION DATA WITH ACCURACIES RANGING FROM A FEW TENS OF PARTS PER MILLION FOR TRACE ELEMENTS TO A FEW PERCENT FOR MAJOR ELEMENTS.

***** VIKING 1 ORBITER*****

SPACECRAFT COMMON NAME- VIKING 1 ORBITER
ALTERNATE NAMES- PL-733B, VIKING-B ORBITER
VIKING-B

NSSDC ID- 75-075A

LAUNCH DATE- 08/20/75 WEIGHT- 1170. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

ORBIT PARAMETERS

ORBIT TYPE- AREOCENTRIC	EPOCH DATE- 06/21/76
ORBIT PERIOD- 1479. MIN	INCLINATION- 37.9 DEG
PERIAPSIS- 1513. KM ALT	APOAPSIS- 32600. KM ALT

PERSONNEL

MG - W. JAKOBOWSKI	NASA HEADQUARTERS
SC - R.S. YOUNG	NASA HEADQUARTERS
PM - K.S. WATKINS	NASA-JPL
PS - C.W. SNYDER	NASA-JPL

BRIEF DESCRIPTION

THE VIKING SPACECRAFT CONSISTED OF AN ORBITER AND A LANDER. THE LANDER SEPARATED FROM THE ORBITER, ENTERED THE MARTIAN ATMOSPHERE, AND SOFT-LANDED JULY 20, 1976. SCIENTIFIC DATA WERE COLLECTED AND TRANSMITTED TO EARTH FROM THE LANDER DURING ENTRY AND WHILE IT WAS ON THE SURFACE, AND FROM THE ORBITER BEFORE AND AFTER LANDER SEPARATION. THE ORBITER WAS A SOLAR-CELL-POWERED SATELLITE STABILIZED IN THREE AXES USING INERTIAL AND CELESTIAL REFERENCES. THERE WAS A 500-W POWER CAPACITY FOR THE ORBITER. IT CARRIED INSTRUMENTS FOR CONDUCTING IMAGING, ATMOSPHERIC WATER VAPOR, THERMAL MAPPING, AND RADIO SCIENCE INVESTIGATIONS. THE SCIENTIFIC AND PHOTOGRAPHIC ANALYSIS INSTRUMENTS HAD A MASS OF APPROXIMATELY 72 KG (158 LB). THE ORBITER WAS AN OCTAGON APPROXIMATELY 2.5 M ACROSS. THE EIGHT SIDES OF THE RING-LIKE STRUCTURE WERE .457 M HIGH AND WERE ALTERNATELY 1.4 AND 0.6 WIDE.

----- VIKING 1 ORBITER, CARR-----

INVESTIGATION NAME- ORBITER IMAGING

NSSDC ID- 75-075A-01

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL

TL - M.H. CARR	US GEOLOGICAL SURVEY
TM - W.A. BAUM	LOWELL OBSERVATORY
TM - H. MASURSKY	US GEOLOGICAL SURVEY
TM - G.A. BRIGGS	NASA HEADQUARTERS
TM - J.A. CUTTS	SCIENCE APPL, INC
TM - T.C. DUXBURY	NASA-JPL
TM - K.R. BLASTUS	SCIENCE APPL, INC
TM - R. GREELEY	ARIZONA STATE U
TM - J.E. GUEST	U OF LONDON
TM - K.A. HOWARD	US GEOLOGICAL SURVEY
TM - B.A. SMITH	U OF ARIZONA
TM - L.A. SODERBLOM	US GEOLOGICAL SURVEY
TM - J. VEVERKA	CORNELL U
TM - J.B. WELLMAN	NASA-JPL

BRIEF DESCRIPTION

THE VIKING VISUAL IMAGING SUBSYSTEM (VIS) CONSISTED OF TWIN HIGH-RESOLUTION, SLOW-SCAN TELEVISION FRAMING CAMERAS MOUNTED ON THE SCAN PLATFORM OF EACH ORBITER WITH THE OPTICAL AXES OFFSET BY 1.38 DEG. EACH OF THE TWO IDENTICAL CAMERAS ON EACH ORBITER HAD A 475-MM FOCAL LENGTH TELESCOPE, A 37-MM DIAMETER VIDICON, THE CENTRAL SECTION OF WHICH WAS SCANNED IN A RASTER FORMAT OF 1056 LINES BY 1182 SAMPLES; AND SIX COLOR FILTERS TO RESTRICT THE SPECTRAL BANDPASS OF AN IMAGE TO LIMITED PORTIONS OF THE CAMERAS' NEAR-VISUAL RESPONSE CHARACTERISTICS. EACH FIELD OF VIEW WAS 1.54 DEG X 1.69 DEG WITH EACH PICTURE ELEMENT (PIXEL) SUBTENDING 25 MICRORADIANS. THE SLIGHT OFFSET OF THE OPTICAL AXES AND THE ALTERNATE SHUTTERING MODE OF OPERATION (THE INTERVAL BETWEEN FRAMES BEING 4.48 S) PROVIDED OVERLAPPING, WIDE-SWATH COVERAGE OF THE SURFACE. INDIVIDUAL IMAGES ARE IDENTIFIED BY PICTURE NUMBER (PICNO), WHICH IS A UNIQUE IDENTIFIER OF THE SCENE. ELEMENTS OF THE PICNO ARE AS FOLLOWS: THE FIRST THREE DIGITS DENOTE THE REVOLUTION (REV) DURING WHICH THE IMAGE WAS SHUTTERED; THE LETTER A IS VIKING ORBITER 1, B IS VIKING ORBITER 2; AND THE LAST TWO DIGITS ARE THE FRAME NUMBER.

----- VIKING 1 ORBITER, FARMER-----

INVESTIGATION NAME- MARS ATMOSPHERIC WATER DETECTION (MAWD)

NSSDC ID- 75-075A-03

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL

TL - C.B. FARMER	NASA-JPL
TM - D.D. LAPORTE	SANTA BARBARA RES CTR
TM - D.W. DAVIES	NASA-JPL

BRIEF DESCRIPTION

THE MAWD USED AN INFRARED GRATING SPECTROMETER MOUNTED ON THE ORBITER SCAN PLATFORM THAT WAS BORESIGHTED WITH THE TELEVISION CAMERAS AND THE IRTM. THE INSTRUMENT MEASURED SOLAR INFRARED RADIATION REFLECTED FROM THE SURFACE THROUGH THE ATMOSPHERE TO THE SPACECRAFT. SPECTRAL INTERVALS WERE SELECTED COINCIDENT WITH THE WAVELENGTH OF WATER VAPOR ABSORPTION LINES IN THE 1.4-MICROMETER BAND. THE QUANTITY OF WATER VAPOR ALONG THE LINE OF SIGHT WAS MEASURED FROM 1 TO 100 MICROMETERS OF PRECIPITABLE WATER WITH AN ACCURACY OF 5 PERCENT OR BETTER. THE INSTANTANEOUS FIELD OF VIEW OF THE INSTRUMENT WAS 2 X 17 MILLIRADIANS, AND A STEPPING MIRROR ROTATED THE LINE OF SIGHT THROUGH 15 POSITIONS TO PROVIDE A ROUGHLY RECTANGULAR FIELD OF VIEW OF 17 X 31 MILLIRADIANS.

----- VIKING 1 ORBITER, KIEFFER-----

INVESTIGATION NAME- INFRARED THERMAL MAPPING (IRTM)

NSSDC ID- 75-075A-02

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL

TL - H.H. KIEFFER	US GEOLOGICAL SURVEY
TM - G. MUNCH	CALIF INST OF TECH
TM - E.D. MINER	NASA-JPL
TM - G. NEUGEBAUER	CALIF INST OF TECH
TM - S.C. CHASE, JR.	SANTA BARBARA RES CTR
TM - F.D. PALLUCONI	NASA-JPL

BRIEF DESCRIPTION

THE PURPOSE OF THE IRTM EXPERIMENT WAS TO MEASURE THE TEMPERATURES OF THE ATMOSPHERE AND AREAS ON THE SURFACE OF MARS. THE AMOUNT OF SUNLIGHT REFLECTED BY THE PLANET WAS ALSO MEASURED. THE IRTM WAS A MULTICHANNEL RADIOMETER MOUNTED ON THE ORBITER'S SCAN PLATFORM. FOUR SMALL TELESCOPES, EACH WITH SEVEN INFRARED DETECTORS, WERE AIMED PARALLEL TO THE VISUAL IMAGING OPTICAL AXIS, AND MADE OBSERVATIONS EVERY 1.12 S. THE INSTRUMENT WAS CAPABLE OF MEASURING DIFFERENCES OF 1 C THROUGHOUT A TEMPERATURE RANGE OF -130 C TO +57 C. THE FIELD OF VIEW WAS CIRCULAR, 5 MILLIRADIANS IN DIAMETER.

----- VIKING 1 ORBITER, MICHAEL, JR.-----

INVESTIGATION NAME- ORBITER RADIO SCIENCE

NSSDC ID- 75-075A-04

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETARY IONOSPHERES
METEOROLOGY

PERSONNEL

TL - W.H. MICHAEL, JR.	NASA-LARC
TM - I.I. SHAPIRO	MASS INST OF TECH
TM - G.F. LINDAL	NASA-JPL
TM - J.G. DAVIES	U OF MANCHESTER
TM - D.L. CAIN	NASA-JPL
TM - M.D. GROSSI	RAYTHEON CORP
TM - G.L. TYLER	STANFORD U
TM - J.P. BRENNLE	NASA-JPL

TM - R.H. TOLSON	NASA-LARC
TM - C.T. STELZRIED	NASA-JPL
TM - G. BORN	NASA-JPL
TM - R. REASENBERG	MASS INST OF TECH

BRIEF DESCRIPTION

THERE ARE FOUR DISTINCT SETS OF VIKING RADIO SCIENCE DATA -- THREE USING ORBITER DATA AND ONE PRIMARILY USING LANDER DATA WITH CALIBRATIONS FROM ORBITER DATA. THE ORBITER TRACKING DATA, OBTAINED FROM THE TWO-WAY ORBITER-EARTH S-BAND AND X-BAND RADIO LINKS, CONSIST OF DOPPLER FREQUENCIES AND TIME-OF-FLIGHT RANGE MEASUREMENTS. THESE DETERMINED THE POSITION AND MOTION OF THE ORBITERS, AND CAN BE USED TO STUDY THE MARS GRAVITATIONAL FIELD, THE PLASMA IN INTERPLANETARY SPACE, AND THE STRUCTURE OF THE SOLAR CORONA. THE OCCULTATION DATA WERE OBTAINED FROM THESE SAME RADIO LINKS BY ANALOG RECORDING OF THE SIGNAL WHEN A SPACECRAFT WAS PASSING INTO OR OUT OF OCCULTATION WITH MARS. THE DATA CAN BE USED TO PRODUCE ALTITUDE PROFILES OF THE TEMPERATURE, DENSITY, AND PRESSURE OF THE ATMOSPHERE (INCLUDING THE IONOSPHERE) AND TO MEASURE THE RADIUS OF THE PLANET USING A LARGE NUMBER OF SURFACE POINTS. THE SURFACE PROPERTIES ASPECT OF THIS INVESTIGATION UTILIZED THE UHF (381 MHZ) SIGNAL ON WHICH THE LANDERS TRANSMITTED DATA TO THE ORBITERS. AT THE BEGINNING OR END OF A DATA TRANSMISSION SESSION, WHEN THE ORBITER WAS NEAR THE LANDER'S HORIZON, THE STRENGTH OF THE RECEIVED SIGNAL WAS RECORDED AS A FUNCTION OF TIME. THESE SIGNAL "FADING PATTERNS," RESULTING FROM INTERACTION OF THE RADIO WAVES WITH THE MARTIAN SURFACE, CONTAIN INFORMATION ABOUT THE PHYSICAL PROPERTIES OF THE SURFACE NEAR THE LANDERS. THE LANDER TRACKING DATA FROM THE TWO-WAY DIRECT LANDER-EARTH S-BAND LINKS PERMIT DETERMINATION OF THE LOCATION OF THE LANDERS AND STUDIES OF THE MOTION OF THE PLANET.

***** VIKING 2 LANDER*****

SPACECRAFT COMMON NAME- VIKING 2 LANDER
ALTERNATE NAMES- VIKING-A LANDER

NSSDC ID- 75-083C

LAUNCH DATE- 09/09/75 WEIGHT- 598. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-DSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- MARS LANDER

PERSONNEL		
MG - W. JAKOBOWSKI	NASA HEADQUARTERS	
SC - R.S. YOUNG	NASA HEADQUARTERS	
PM - K.S. WATKINS	NASA-JPL	
PS - C.W. SNYDER	NASA-JPL	

BRIEF DESCRIPTION

THIS SPACECRAFT WAS THE LANDING VEHICLE FOR THE TWO-PART SPACECRAFT MISSION. IT SOFT-LANDED ON SEPTEMBER 3, 1976, IN THE CYDONIA REGION OF MARS AT 47.67 DEG N LATITUDE AND 225.71 DEG W LONGITUDE. THE LANDER CARRIED INSTRUMENTS TO STUDY THE BIOLOGY, CHEMICAL COMPOSITION (ORGANIC AND INORGANIC), METEOROLOGY, SEISMOLOGY, MAGNETIC PROPERTIES, SURFACE APPEARANCE, AND PHYSICAL PROPERTIES OF THE MARTIAN SURFACE AND ATMOSPHERE. THE LANDER HAD A 70-W POWER CAPACITY AND A SCIENTIFIC PAYLOAD OF APPROXIMATELY 91 KG (200 LB). SOME OF THE DATA COLLECTED WERE RETURNED BY DIRECT RADIO LINK TO EARTH, BUT MOST OF THE DATA WERE RETURNED BY RELAY THROUGH ONE OF THE ORBITERS. THE LANDER WAS APPROXIMATELY 3 M ACROSS AND ABOUT 2M HIGH.

----- VIKING 2 LANDER, ANDERSON-----

INVESTIGATION NAME- SEISMOLOGY

NSSDC ID- 75-083C-08

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY
PLANETARY PHYSICS

PERSONNEL		
TL - D.L. ANDERSON	CALIF INST OF TECH	
TM - M.N. TOKSOZ	MASS INST OF TECH	
TM - G.H. SUTTON	U OF HAWAII	
TM - R.L. KOVACH	STANFORD U	
TM - G.V. LATHAM	U OF TEXAS, GALVESTON	
TM - F. DUENNEBLER	U OF HAWAII	

BRIEF DESCRIPTION

THE SEISMOLOGY EXPERIMENT WAS DESIGNED TO DETERMINE THE LEVEL OF SEISMIC ACTIVITY ON MARS AND ITS INTERNAL STRUCTURE. THE SEISMOLOGY INSTRUMENT CONTAINED THREE MUTUALLY PERPENDICULAR SEISMOMETERS. EACH SEISMOMETER CONSISTED OF A MOVING COIL AND A FIXED MAGNET. THE OPERATING MODES WERE: SELECTION OF VARIOUS FILTERS FOR FREQUENCY CONTENT OR TO ADJUST TO BEST RECEPTION OF SPECIFIC TYPES OF DATA, A LOW SAMPLING RATE FOR GENERAL ACTIVITY, A HIGH DATA RATE FOR DETAILED EXAMINATION OF EVENTS, AND A COMPRESSED MEDIUM RATE FOR CONTINUOUS MONITORING OF MARSQUAKES THAT WERE DORMANT UNTIL ACTIVATED BY AN EVENT. THE DATA WERE COMPRESSED FOR

TRANSMISSION TO EARTH BY AVERAGING THE AMPLITUDE OF NORMAL GROUND NOISE OVER A 15-S PERIOD. WHEN AN EVENT OCCURRED, A TRIGGER ACTIVATED A HIGHER DATA RATE MODE THAT SAMPLED THE AMPLITUDE OF THE OVERALL EVENT ENVELOPE, WHICH REQUIRED ONLY ONE AMPLITUDE SAMPLE PER SECOND TO INDICATE ITS SHAPE. AT THE SAME TIME, THE CHANGE IN POLARITY OF THE DATA SIGNAL (CAUSED BY CROSSING THE ZERO AXIS) WAS SAMPLED ONCE EACH SECOND. THE SHAPE OF THE ENVELOPE AND ITS INCREMENTAL FREQUENCY CONTENT WAS TRANSMITTED TO EARTH AND RECONSTRUCTED TO APPROXIMATE THE ORIGINAL EVENT. THE VIKING 1 SEISMOMETER FAILED TO UNCAGE AND COULD NOT BE USED IN A SEISMIC NETWORK WITH THE VIKING 2 INSTRUMENT.

----- VIKING 2 LANDER, HESS-----

INVESTIGATION NAME- METEOROLOGY

NSSDC ID- 75-083C-07

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL		
TL - S.L. HESS	FLORIDA STATE U	
TM - C.B. LEOVY	U OF WASHINGTON	
TM - R.M. HENRY	U OF WASHINGTON	
TM - J.A. RYAN	CALIF ST U, FULLERTON	
TM - J.E. TILLMAN	U OF WASHINGTON	

BRIEF DESCRIPTION

THIS EXPERIMENT ANALYZED THE METEOROLOGICAL ENVIRONMENT NEAR THE PLANETARY SURFACE AND OBTAINED INFORMATION ABOUT MOTION SYSTEMS OF VARIOUS SCALES. THE ATMOSPHERIC PARAMETERS DETERMINED WERE PRESSURE, TEMPERATURE, WIND SPEED, AND WIND DIRECTION. DIURNAL AND SEASONAL VARIATIONS WERE OF PARTICULAR IMPORTANCE. THE SAMPLING RATES AND DURATIONS FOR ANY ONE MARTIAN DAY (SOL) WERE SELECTABLE BY GROUND COMMAND. THE SENSORS WERE MOUNTED ON AN ERECTED BOOM. THREE HOT-FILM ANEMOMETERS, THROUGH WHICH AN ELECTRIC CURRENT WAS PASSED TO HEAT TWO GLASS NEEDLES COATED WITH PLATINUM AND OVERCOATED WITH ALUMINUM OXIDE, WERE USED TO MEASURE WIND SPEED. THE ELECTRIC POWER NEEDED TO MAINTAIN THESE SENSORS AT A FIXED TEMPERATURE ABOVE THE SURROUNDING AIR WAS THE MEASURE OF WIND SPEED. ATMOSPHERIC TEMPERATURE WAS MEASURED BY THREE FINE-WIRE THERMOCOUPLES IN PARALLEL. A THIN METAL DIAPHRAGM, MOUNTED IN A VACUUM-SEALED CASE, WAS USED TO MEASURE ATMOSPHERIC PRESSURE.

----- VIKING 2 LANDER, MUTCH-----

INVESTIGATION NAME- LANDER IMAGING

NSSDC ID- 75-083C-06

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
METEOROLOGY
PLANETOLOGY

PERSONNEL		
TL - T.A. MUTCH	NASA HEADQUARTERS	
TM - C. SAGAN	CORNELL U	
TM - A.B. BINDER	SCIENCE APPL. INC	
TM - E.C. MORRIS	US GEOLOGICAL SURVEY	
TM - F.O. HUCK	NASA-LARC	
TM - E.C. LEVINTHAL	STANFORD U	
TM - S. LIEBES, JR.	STANFORD U	
TM - J.B. POLLACK	NASA-ARC	
TM - R.E. ARVIDSON	WASHINGTON U	

BRIEF DESCRIPTION

THE LANDER IMAGING EXPERIMENT VIEWED THE SCENE SURROUNDING THE LANDER, THE SURFACE SAMPLER AND OTHER PARTS OF THE LANDER, THE SUN, AND PHOBOS TO PROVIDE DATA FOR OPERATIONAL PURPOSES AND FOR GEOLOGICAL AND METEOROLOGICAL INVESTIGATIONS. TWO SCANNING CAMERAS, CAPABLE OF RESOLVING 0.04 DEG (HIGH RESOLUTION) OR 0.12 DEG (LOW RESOLUTION, COLOR, AND IR) WERE USED ON EACH LANDER. EACH IMAGE ACQUIRED COVERED A VERTICAL FIELD OF 20 DEG (HIGH RESOLUTION) OR 60 DEG (LOW RESOLUTION, COLOR, AND IR) AND A HORIZONTAL FIELD THAT WAS COMMANDABLE FROM 2.5 DEG TO 342.5 DEG IN 2.5-DEG INCREMENTS. IMAGES WERE ACQUIRED FROM 40 DEG ABOVE THE NOMINAL HORIZON TO 60 DEG BELOW, AND WERE COMMANDABLE IN 10-DEG INCREMENTS. THE CAMERAS WERE MOUNTED 1.3 M ABOVE THE NOMINAL LANDING PLANE AND WERE CAPABLE OF VIEWING TWO FOOTPADS AND MOST OF THE AREA ACCESSIBLE TO THE SURFACE SAMPLER. THE TWO CAMERAS WERE SEPARATED BY 0.8 M, AND STEREOSCOPIC PICTURES WERE OBTAINED OVER MOST OF THE SCENE. BLACK AND WHITE IMAGES IN EITHER LOW OR HIGH RESOLUTION INCLUDED RADIATION WAVELENGTHS FROM 0.4 TO 1.1 MICROMETERS. THE USE OF A SINGLE DETECTOR TO IMAGE AN ENTIRE FRAME ALLOWED A RELATIVE RADIOMETRIC ACCURACY OF PLUS OR MINUS 10 PERCENT. FOR MORE INFORMATION CONCERNING THE CAMERAS, SEE HUCK ET AL., 'SPACE SCIENCE INSTRUMENTATION 1,' 189-241 (1975).

----- VIKING 2 LANDER, TOULMIN, 3RD-----

INVESTIGATION NAME- INORGANIC ANALYSIS

NSSDC ID- 75-083C-13

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY

PERSONNEL

TL - P. TOULMIN, 3RD	US GEOLOGICAL SURVEY
TM - A.K. BAIRD	POMONA COLLEGE
TM - K. KEIL	U OF NEW MEXICO
TM - H.J. ROSE	US GEOLOGICAL SURVEY
TM - B.C. CLARK	MARTIN-MARIETTA AEROSP

BRIEF DESCRIPTION

THIS EXPERIMENT UTILIZED AN ENERGY-DISPERSIVE X-RAY FLUORESCENCE SPECTROMETER (XRF) IN WHICH FOUR SEALED, GAS-FILLED PROPORTIONAL COUNTERS (PC'S) DETECTED X RAYS EMITTED FROM SAMPLES OF MARTIAN SURFACE MATERIALS IRRADIATED BY X RAYS FROM RADIOISOTOPE SOURCES (IRON-55 AND CADMIUM-109). THE OUTPUT OF THE PROPORTIONAL COUNTERS WAS SUBJECTED TO PULSE HEIGHT ANALYSIS BY AN ONBOARD STEP-SCANNING, SINGLE-CHANNEL ANALYZER WITH ADJUSTABLE COUNTING PERIODS. THIS INSTRUMENT WAS LOCATED INSIDE THE LANDER BODY, AND SAMPLES WERE DELIVERED TO IT BY THE LANDER SURFACE SAMPLER. CALIBRATION STANDARDS WERE AN INTEGRAL PART OF THE INSTRUMENT. RECONSTRUCTED SPECTRA YIELDED SURFACE COMPOSITION DATA WITH ACCURACIES RANGING FROM A FEW TENS OF PARTS PER MILLION FOR TRACE ELEMENTS TO A FEW PERCENT FOR MAJOR ELEMENTS.

***** VIKING 2 ORBITER*****

SPACECRAFT COMMON NAME- VIKING 2 ORBITER
ALTERNATE NAMES- PL-733A, VIKING-A
VIKING-A ORBITER

NSSDC ID- 75-083A

LAUNCH DATE- 09/09/75 WEIGHT- 1092. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

ORBIT PARAMETERS
ORBIT TYPE- AREOCENTRIC EPOCH DATE- 08/09/76
ORBIT PERIOD- 1639. MIN INCLINATION- 55.2 DEG
PERIAPSIS- 1499. KM ALT APOAPSIS- 35800. KM ALT

PERSONNEL

MG - W. JAKOBOWSKI	NASA HEADQUARTERS
SC - R.S. YOUNG	NASA HEADQUARTERS
PM - K.S. WATKINS	NASA-JPL
PS - C.W. SNYDER	NASA-JPL

BRIEF DESCRIPTION

THE VIKING SPACECRAFT CONSISTED OF AN ORBITER AND A LANDER. THE LANDER SEPARATED FROM THE ORBITER, ENTERED THE MARTIAN ATMOSPHERE, AND SOFT-LANDED SEPTEMBER 3, 1976. SCIENTIFIC DATA WERE COLLECTED AND TRANSMITTED TO EARTH FROM THE LANDER DURING ENTRY AND WHILE IT WAS ON THE SURFACE, AND FROM THE ORBITER BEFORE AND AFTER LANDER SEPARATION. THE ORBITER WAS A SOLAR-CELL-POWERED SATELLITE STABILIZED IN THREE AXES USING INERTIAL AND CELESTIAL REFERENCES. THERE WAS A 500-W POWER CAPACITY FOR THE ORBITER. IT CARRIED INSTRUMENTS FOR CONDUCTING IMAGING, ATMOSPHERIC WATER VAPOR, THERMAL MAPPING, AND RADIO SCIENCE INVESTIGATIONS. THE SCIENTIFIC AND PHOTOGRAPHIC ANALYSIS INSTRUMENTS HAD A MASS OF APPROXIMATELY 72 KG (158 LB). BECAUSE OF THE LOSS OF ATTITUDE FUEL, THE TRANSMITTERS AND EXPERIMENTS WERE TURNED OFF JULY 25, 1978. THE ORBITER WAS AN OCTAGON APPROXIMATELY 2.5 M ACROSS. THE EIGHT SIDES OF THE RING-LIKE STRUCTURE WERE .457 M HIGH AND WERE ALTERNATELY 1.4 AND 0.6 WIDE.

----- VIKING 2 ORBITER, CARR-----

INVESTIGATION NAME- ORBITER IMAGING

NSSDC ID- 75-083A-01

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL

TL - M.H. CARR	US GEOLOGICAL SURVEY
TM - W.A. BAUM	LOWELL OBSERVATORY
TM - H. MASURSKY	US GEOLOGICAL SURVEY
TM - G.A. BRIGGS	NASA HEADQUARTERS
TM - J.A. CUTTS	SCIENCE APPL, INC
TM - T.C. DUXBURY	NASA-JPL
TM - K.R. BLASTUS	SCIENCE APPL, INC
TM - R. GREELEY	ARIZONA STATE U
TM - J.E. GUEST	U OF LONDON
TM - K.A. HOWARD	US GEOLOGICAL SURVEY
TM - B.A. SMITH	U OF ARIZONA
TM - L.A. SODERBLOM	US GEOLOGICAL SURVEY
TM - J. VEVERKA	CORNELL U
TM - J.B. WELLMAN	NASA-JPL

BRIEF DESCRIPTION

THE VIKING VISUAL IMAGING SUBSYSTEM (VIS) CONSISTED OF TWIN HIGH-RESOLUTION, SLOW-SCAN TELEVISION FRAMING CAMERAS MOUNTED ON THE SCAN PLATFORM OF EACH ORBITER WITH THE OPTICAL AXES OFFSET BY 1.38 DEG. EACH OF THE TWO IDENTICAL CAMERAS ON EACH ORBITER HAD A 475-MM FOCAL LENGTH TELESCOPE; A 37-MM DIAMETER VIDICON, THE CENTRAL SECTION OF WHICH WAS SCANNED IN A RASTER FORMAT OF 1056 LINES BY 1182 SAMPLES; AND SIX COLOR FILTERS TO RESTRICT THE SPECTRAL BANDPASS OF AN IMAGE TO LIMITED PORTIONS OF THE CAMERAS' NEAR-VISUAL RESPONSE CHARACTERISTICS. EACH FIELD OF VIEW WAS 1.54 DEG X 1.69 DEG WITH EACH PICTURE ELEMENT (PIXEL) SUBTENDING 25 MICRORADIANS. THE SLIGHT OFFSET OF THE OPTICAL AXES AND THE ALTERNATE SHUTTERING MODE OF OPERATION (THE INTERVAL BETWEEN FRAMES BEING 4.48 S) PROVIDED OVERLAPPING, WIDE-SWATH COVERAGE OF THE SURFACE. INDIVIDUAL IMAGES ARE IDENTIFIED BY PICTURE NUMBER (PICNO), WHICH IS A UNIQUE IDENTIFIER OF THE SCENE. ELEMENTS OF THE PICNO ARE AS FOLLOWS: THE FIRST THREE DIGITS DENOTE THE REVOLUTION (REV) DURING WHICH THE IMAGE WAS SHUTTERED; LETTER A IS VIKING ORBITER 1, B IS VIKING ORBITER 2; AND THE LAST TWO DIGITS ARE THE FRAME NUMBER.

----- VIKING 2 ORBITER, FARMER-----

INVESTIGATION NAME- MARS ATMOSPHERIC WATER DETECTION (MAWD)

NSSDC ID- 75-083A-03

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL

TL - C.B. FARMER	NASA-JPL
TM - D.D. LAPORTE	SANTA BARBARA RES CTR
TM - D.W. DAVIES	NASA-JPL

BRIEF DESCRIPTION

THE MAWD USED AN INFRARED GRATING SPECTROMETER MOUNTED ON THE ORBITER SCAN PLATFORM THAT WAS BORESIGHTED WITH THE TELEVISION CAMERAS AND THE IRTM. THE INSTRUMENT MEASURED SOLAR INFRARED RADIATION REFLECTED FROM THE SURFACE THROUGH THE ATMOSPHERE TO THE SPACECRAFT. SPECTRAL INTERVALS WERE SELECTED COINCIDENT WITH THE WAVELENGTH OF WATER VAPOR ABSORPTION LINES IN THE 1.4-MICROMETER BAND. THE QUANTITY OF WATER VAPOR ALONG THE LINE OF SIGHT WAS MEASURED FROM 1 TO 1000 MICROMETERS OF PRECIPITABLE WATER WITH AN ACCURACY OF 5 PERCENT OR BETTER. THE INSTANTANEOUS FIELD OF VIEW OF THE INSTRUMENT WAS 2 X 17 MILLIRADIANS, AND A STEPPING MIRROR ROTATED THE LINE OF SIGHT THROUGH 15 POSITIONS TO PROVIDE A ROUGHLY RECTANGULAR FIELD OF VIEW OF 17 X 31 MILLIRADIANS.

----- VIKING 2 ORBITER, KIEFFER-----

INVESTIGATION NAME- INFRARED THERMAL MAPPING (IRTM)

NSSDC ID- 75-083A-02

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL

TL - H.H. KIEFFER	US GEOLOGICAL SURVEY
TM - G. MUNCH	CALIF INST OF TECH
TM - E.D. MINER	NASA-JPL
TM - G. NEUGEBAUER	CALIF INST OF TECH
TM - S.C. CHASE, JR.	SANTA BARBARA RES CTR
TM - F.D. PALLUONI	NASA-JPL

BRIEF DESCRIPTION

THE PURPOSE OF THE IRTM EXPERIMENT WAS TO MEASURE THE TEMPERATURES OF THE ATMOSPHERE AND AREAS ON THE SURFACE OF MARS. THE AMOUNT OF SUNLIGHT REFLECTED BY THE PLANET WAS ALSO MEASURED. THE IRTM WAS A MULTICHANNEL RADIOMETER MOUNTED ON THE ORBITER'S SCAN PLATFORM. FOUR SMALL TELESCOPES, EACH WITH SEVEN INFRARED DETECTORS, WERE AIMED PARALLEL TO THE VISUAL IMAGING OPTICAL AXIS, AND MADE OBSERVATIONS EVERY 1.12 S. THE INSTRUMENT WAS CAPABLE OF MEASURING DIFFERENCES OF 1 C THROUGHOUT A TEMPERATURE RANGE OF -130 C TO +57 C. THE FIELD OF VIEW WAS CIRCULAR, 5 MILLIRADIANS IN DIAMETER.

----- VIKING 2 ORBITER, MICHAEL, JR.-----

INVESTIGATION NAME- ORBITER RADIO SCIENCE

NSSDC ID- 75-083A-04

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL

TL - W.H. MICHAEL, JR.	NASA-LARC
TM - I.I. SHAPIRO	MASS INST OF TECH
TM - G.F. LINDAL	NASA-JPL
TM - J.G. DAVIES	U OF MANCHESTER
TM - D.L. CAIN	NASA-JPL
TM - M.D. GROSSI	RAYTHEON CORP
TM - G.L. TYLER	STANFORD U

TM - J.P. BREngle
TM - R.H. TOLSON
TM - C.T. STELZRIED
TM - G. BORN
TM - R. REASENBERG

NASA-JPL
NASA-LARC
NASA-JPL
NASA-JPL
MASS INST OF TECH

CI - A.J. HUNDHAUSEN
CI - J.D. SULLIVAN
CI - C.M. YEATES

NATL CTR FOR ATMOS RES
MASS INST OF TECH
NASA-JPL

BRIEF DESCRIPTION

THERE ARE FOUR DISTINCT SETS OF VIKING RADIO SCIENCE DATA -- THREE USING ORBITER DATA AND ONE PRIMARILY USING LANDER DATA WITH CALIBRATIONS FROM ORBITER DATA. THE ORBITER TRACKING DATA, OBTAINED FROM THE TWO-WAY ORBITER-EARTH S-BAND AND X-BAND RADIO LINKS, CONSIST OF DOPPLER FREQUENCIES AND TIME-OF-FLIGHT RANGE MEASUREMENTS. THESE DETERMINED THE POSITION AND MOTION OF THE ORBITERS, AND CAN BE USED TO STUDY THE MARS GRAVITATIONAL FIELD, THE PLASMA IN INTERPLANETARY SPACE, AND THE STRUCTURE OF THE SOLAR CORONA WHEN THE SPACECRAFT WAS ON THE OPPOSITE SIDE OF THE SUN. THE OCCULTATION DATA WERE OBTAINED FROM THESE SAME RADIO LINKS BY ANALOG RECORDING OF THE SIGNAL WHEN A SPACECRAFT WAS PASSING INTO OR OUT OF OCCULTATION WITH MARS. THE DATA CAN BE USED TO PRODUCE ALTITUDE PROFILES OF THE TEMPERATURE, DENSITY, AND PRESSURE OF THE ATMOSPHERE (INCLUDING THE IONOSPHERE) AND TO MEASURE THE RADIUS OF THE PLANET USING A LARGE NUMBER OF SURFACE POINTS. THE SURFACE PROPERTIES ASPECT OF THIS INVESTIGATION UTILIZED THE UHF (381 MHZ) SIGNAL ON WHICH THE LANDERS TRANSMITTED DATA TO THE ORBITERS. AT THE BEGINNING OR END OF A DATA TRANSMISSION SESSION, WHEN THE ORBITER WAS NEAR THE LANDER'S HORIZON, THE STRENGTH OF THE RECEIVED SIGNAL WAS RECORDED AS A FUNCTION OF TIME. THESE SIGNAL "FADING PATTERNS," RESULTING FROM INTERACTION OF THE RADIO WAVES WITH THE MARTIAN SURFACE, CONTAIN INFORMATION ABOUT THE PHYSICAL PROPERTIES OF THE SURFACE NEAR THE LANDERS. THE LANDER TRACKING DATA FROM THE TWO-WAY DIRECT LANDER-EARTH S-BAND LINKS PERMIT DETERMINATION OF THE LOCATION OF THE LANDERS AND STUDIES OF THE MOTION OF THE PLANET.

***** VOYAGER 1*****

SPACECRAFT COMMON NAME- VOYAGER 1
ALTERNATE NAMES- MARINER JUPITER/SATURN A, OUTER PLANETS A
MARINER 77A, MJS 77A
10321

NSSDC ID- 77-084A

LAUNCH DATE- 09/05/77 WEIGHT- 700. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- SATURN FLYBY

PERSONNEL
MG - R.A. MILLS NASA HEADQUARTERS
SC - M.A. MITZ NASA HEADQUARTERS
PM - R.L. HEACOCK NASA-JPL
PS - E.C. STONE CALIF INST OF TECH

BRIEF DESCRIPTION

THE OVERALL OBJECTIVES OF VOYAGER WERE TO CONDUCT EXPLORATORY INVESTIGATIONS OF THE PLANETARY SYSTEMS OF JUPITER AND SATURN AND OF THE INTERPLANETARY MEDIUM OUT TO SATURN. PRIMARY EMPHASIS WAS PLACED ON COMPARATIVE STUDIES OF THESE TWO PLANETARY SYSTEMS BY OBTAINING (1) MEASUREMENTS OF THE ENVIRONMENT, ATMOSPHERE, AND BODY CHARACTERISTICS OF THE PLANETS AND ONE OR MORE OF THE SATELLITES OF EACH PLANET, (2) STUDIES OF THE NATURE OF THE RINGS OF SATURN, AND (3) EXPLORATION OF THE INTERPLANETARY (OR INTERSTELLAR) MEDIUM AT INCREASING DISTANCES FROM THE SUN. THESE OBJECTIVES WERE ATTAINED BY USING A VARIETY OF INSTRUMENTS AND METHODS INCLUDING IMAGING, A COHERENT S- AND X-BAND RF RECEIVER, AN INFRARED INTERFEROMETER AND RADIOMETER, UV SPECTROMETER, FLUXGATE MAGNETOMETERS, FARADAY CUPS, A CHARGED PARTICLE ANALYZER, PLASMA DETECTOR, PLASMA WAVE RADIO RECEIVER, COSMIC RAY TELESCOPES, PHOTOPOLARIMETER, AND A SWEEP FREQUENCY RADIO RECEIVER. VOYAGER 1 HAD ITS CLOSEST ENCOUNTER WITH JUPITER ON MARCH 5, 1979.

----- VOYAGER 1, BRIDGE-----

INVESTIGATION NAME- PLASMA SPECTROMETERS

NSSDC ID- 77-084A-06 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL
PI - H.S. BRIDGE MASS INST OF TECH
CI - J.W. BELCHER MASS INST OF TECH
CI - J.H. BINSACK MASS INST OF TECH
CI - A.J. LAZARUS MASS INST OF TECH
CI - S. OLBERT MASS INST OF TECH
CI - V.M. VASYLIUNAS MPI-AERONOMY
CI - L.F. BURLAGA NASA-GSFC
CI - R.E. HARTLE NASA-GSFC
CI - K.W. OGILVIE NASA-GSFC
CI - G.L. SISCOE U OF CALIF, LA

BRIEF DESCRIPTION

THE PLASMA INVESTIGATION MADE USE OF TWO FARADAY CUP DETECTORS, ONE POINTED ALONG THE EARTH-SPACECRAFT LINE AND ONE AT RIGHT ANGLES TO THIS LINE. THE EARTH-POINTING DETECTOR DETERMINED THE MACROSCOPIC PROPERTIES OF THE PLASMA IONS, OBTAINING ACCURATE VALUES OF THEIR VELOCITY, DENSITIES, AND PRESSURE. THREE SEQUENTIAL ENERGY SCANS WERE EMPLOYED WITH (DELTA E)/E EQUAL TO 20, 7.2, AND 1.8 PERCENT, ALLOWING A COVERAGE FROM SUBSONIC TO HIGHLY SUPERSONIC FLOW. THE SIDE-LOOKING FARADAY CUP MEASURED ELECTRONS IN THE ENERGY RANGE FROM 5 EV TO 1 KEV.

----- VOYAGER 1, BROADFOOT-----

INVESTIGATION NAME- ULTRAVIOLET SPECTROSCOPY

NSSDC ID- 77-084A-04 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL
PI - A.L. BROADFOOT KITT PEAK NATL OBS
CI - H.W. MOOS JOHNS HOPKINS U
CI - M.J.S. BELTON KITT PEAK NATL OBS
CI - D.F. STROBEL US NAVAL RESEARCH LAB
CI - T.M. DONAHUE U OF MICHIGAN
CI - M.B. MCELROY HARVARD U
CI - J.C. MCCONNELL YORK U
CI - R.M. GOODY HARVARD U
CI - A. DALGARNO SAO
CI - J.E. BLAMONT CNRS-SA
CI - J.L. BERTAUX CNRS-SA
CI - S.K. ATREYA U OF MICHIGAN
CI - B.R. SANDEL U OF SOUTHERN CALIF
CI - D.E. SHERMANSKY U OF SOUTHERN CALIF

BRIEF DESCRIPTION

THE UV SPECTROMETER WAS DESIGNED TO MEASURE ATMOSPHERIC PROPERTIES AND MEASURE RADIATION IN THE WAVELENGTH RANGE FROM 400 TO 1600 A. TWO MODES OF INSTRUMENT OPERATION WERE PLANNED, AIRGLOW AND OCCULTATION. IN THE AIRGLOW MODE THE ATMOSPHERIC RADIATION WAS MEASURED. THIS RADIATION IS PREDOMINANTLY RESONANCE SCATTERED SOLAR RADIATION, WHERE THE SCATTERING IS BY MOLECULAR OR ATOMIC ATMOSPHERIC CONSTITUENTS SUCH AS, HYDROGEN (1216 A) OR HELIUM (584 A). IN THE OCCULTATION MODE SUNLIGHT IS REFLECTED INTO THE SPECTROMETER, AND THE SOLAR SPECTRUM WAS RECORDED. AS THE ATMOSPHERE MOVES BETWEEN THE SPACECRAFT AND THE SUN, THE ABSORPTION CHARACTERISTICS OF THE ATMOSPHERE WERE OBTAINED OVER THE MEASURED WAVELENGTH REGION. THE ABSORPTION SPECTRUM WAS USED TO IDENTIFY THE ABSORBER AS WELL AS TO MEASURE ITS ABUNDANCE IN THE LINE OF SIGHT TO THE SUN. IN ADDITION, THE ATMOSPHERIC THERMAL STRUCTURE COULD BE INFERRED.

----- VOYAGER 1, ESHLEMAN-----

INVESTIGATION NAME- RADIO SCIENCE TEAM

NSSDC ID- 77-084A-02 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
CELESTIAL MECHANICS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL
PI - V.R. ESHLEMAN STANFORD U
CI - G.L. TYLER STANFORD U
CI - J.D. ANDERSON NASA-JPL
CI - T.A. CROFT SRI INTERNATIONAL
CI - G.F. LINDAL NASA-JPL
CI - G.S. LEVY NASA-JPL
CI - G.E. WOOD NASA-JPL

BRIEF DESCRIPTION

THE RADIO SCIENCE TEAM USED THE TELECOMMUNICATIONS SYSTEM OF THE VOYAGER SPACECRAFT TO PERFORM THEIR STUDIES. THE SYSTEM WAS A COHERENT S- AND X-BAND DOWNLINK AND S-BAND UPLINK. THE SCIENCE OBJECTIVES OF THE RADIO SCIENCE INVESTIGATION WERE: (1) DETERMINE THE PHYSICAL PROPERTIES OF PLANETARY AND SATELLITE IONOSPHERES AND ATMOSPHERES BY EXAMINING THE PROPAGATION EFFECTS ON A DUAL-FREQUENCY RADIO SIGNAL DURING IMMERSION AND EMERSION OF SPACECRAFT OCCULTATION BY THE SUBJECT BODY, (2) DETERMINE PLANETARY AND SATELLITE MASSES, GRAVITY FIELDS, AND DENSITIES BY PRECISE TRACKING OF A DUAL-FREQUENCY RADIO SIGNAL FROM THE SPACECRAFT DURING THE ENCOUNTER PERIOD, AND (3) DETERMINE THE AMOUNT AND SIZE DISTRIBUTION OF MATERIAL IN SATURN'S RINGS AND THE RING DIMENSIONS BY EXAMINING THE PROPAGATION EFFECTS ON A DUAL-FREQUENCY RADIO SIGNAL THAT PASSES THROUGH EACH RING IN SUCCESSION, AND THROUGH THE GAP BETWEEN THE C RING AND SATURN'S SURFACE.

----- VOYAGER 1, HANEL-----

INVESTIGATION NAME- INFRARED SPECTROSCOPY AND RADIOMETRY

INVESTIGATION NAME- INFRARED SPECTROSCOPY AND RADIOMETRY

NSSDC ID- 77-084A-03

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - R.A. HANEL	NASA-GSFC
CI - B.J. CONRATH	NASA-GSFC
CI - V.G. KUNDE	NASA-GSFC
CI - P.D. LOWMAN, JR.	NASA-GSFC
CI - W.C. MAGUIRE	NASA-GSFC
CI - J.C. PEARL	NASA-GSFC
CI - J.A. PIRAGLIA	NASA-GSFC
CI - R.E. SAMUELSON	NASA-GSFC
CI - P.J. GIERASCH	CORNELL U
CI - C.A. PONNAMPERUMA	U OF MARYLAND
CI - D. GAUTIER	PARIS OBSERVATORY

BRIEF DESCRIPTION

THIS INVESTIGATION WAS CARRIED OUT USING AN INFRARED RADIOMETER AND AN INTERFEROMETER SPECTROMETER SIMILAR IN DESIGN TO THE MARINER MARS-71 IRIS, COMBINED INTO A SINGLE INSTRUMENT. THE INVESTIGATION STUDIED BOTH GLOBAL AND LOCAL ENERGY BALANCE, USING INFRARED SPECTRAL MEASUREMENTS IN CONJUNCTION WITH BROAD-BAND MEASUREMENTS OF REFLECTED SOLAR ENERGY. ATMOSPHERIC COMPOSITION WAS ALSO INVESTIGATED, INCLUDING DETERMINATION OF THE H₂/HE RATIO, AND THE ABUNDANCE OF CH₄ AND NH₃. VERTICAL TEMPERATURE PROFILES WERE OBTAINED ON THE PLANETS AND SATELLITES WITH ATMOSPHERES. STUDIES OF THE COMPOSITION, THERMAL PROPERTIES, AND SIZE OF PARTICLES IN SATURN'S RINGS WILL BE CONDUCTED. THE INTERFEROMETER HAS A SPECTRAL RANGE OF 200 TO 4000 1/CM, WHILE THE RADIOMETER RANGE COVERS 5000 TO 33,000 1/CM. THE INSTRUMENT USES A SINGLE PRIMARY MIRROR 51 CM IN DIAM. WITH A FIELD OF VIEW OF 0.25 DEG.

----- VOYAGER 1, KRIMIGIS-----

INVESTIGATION NAME- LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE

NSSDC ID- 77-084A-07

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - S.M. KRIMIGIS	APPLIED PHYSICS LAB
CI - C.Y. FAN	U OF ARIZONA
CI - G. GLOECKLER	U OF MARYLAND
CI - L.J. LANZEROTTI	BELL TELEPHONE LAB
CI - T.P. ARMSTRONG	U OF KANSAS
CI - W.I. AXFORD	MPI-AERONOMY
CI - C.O. BOSTROM	APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT WAS TO STUDY THE MAGNETOSPHERES OF JUPITER AND SATURN USING A LOW-ENERGY MAGNETOSPHERIC PARTICLE ANALYZER. THIS DETECTOR MADE MEASUREMENTS IN (1) THE DISTANT MAGNETOSPHERE AND BOW SHOCK OF JUPITER, (2) THE POSSIBLE MAGNETOSPHERE OF SATURN, AND (3) THE TRAPPED RADIATION BELTS IN THE VICINITY OF JUPITER. ADDITIONALLY, THIS DETECTOR WAS ABLE TO STUDY LOW-ENERGY PARTICLES IN THE INTERPLANETARY MEDIUM. THE ENERGY RANGE OF THIS DETECTOR WAS 10 KEV TO 1.1 MEV FOR ELECTRONS AND 10 KEV TO 150 MEV FOR IONS. DURING THE INTERPLANETARY CRUISE PERIOD, PROTONS, ALPHA PARTICLES, AND HEAVIER NUCLEI (Z FROM 3 TO 26) WERE SEPARATELY IDENTIFIED AND THEIR ENERGY MEASURED IN THE RANGE FROM 0.05 TO 30 MEV, USING A LOW-ENERGY PARTICLE TELESCOPE.

----- VOYAGER 1, LILLIE-----

INVESTIGATION NAME- MULTIFILTER PHOTOPOLARIMETER,
2200-7300 A

NSSDC ID- 77-084A-11

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST
PLANETARY ATMOSPHERES

PERSONNEL

PI - C.F. LILLIE	U OF COLORADO
CI - C.W. HORD	U OF COLORADO
CI - K. PANG	SCIENCE APPL, INC
CI - J.E. HANSEN	NASA-GISS
CI - D.L. COFFEEN	NASA-GISS

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF AN 8-IN. F/1.1 TELESCOPE THAT COULD SEND ITS OBSERVATIONS THROUGH A POLARIZER AND A FILTER FOR ONE OF EIGHT BANDS IN THE 2200- TO 7300-A SPECTRAL REGION, THEN ON TO A PHOTOMULTIPLIER TUBE. BY STUDY OF THESE EMISSION INTENSITY DATA, INFORMATION ON SURFACE TEXTURE AND COMPOSITION OF BOTH PLANETS (JUPITER AND SATURN) COULD BE OBTAINED, ALONG WITH INFORMATION ON SIZE DISTRIBUTION AND COMPOSITION OF THE SATURN RINGS AND INFORMATION ON ATMOSPHERIC SCATTERING PROPERTIES AND DENSITY FOR BOTH PLANETS. MOLECULAR SCALE HEIGHTS FOR BOTH PLANETS COULD ALSO BE DETERMINED FROM THESE DATA.

----- VOYAGER 1, NESS-----

INVESTIGATION NAME- TRIAXIAL FLUXGATE MAGNETOMETERS

NSSDC ID- 77-084A-05

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY MAGNETIC FIELD
PARTICLES AND FIELDS
INTERPLANETARY MAGNETIC FIELDS

PERSONNEL

PI - N.F. NESS	NASA-GSFC
CI - M.H. ACUNA	NASA-GSFC
CI - K.W. BEHANNON	NASA-GSFC
CI - L.F. BURLAGA	NASA-GSFC
CI - R.P. LEPPING	NASA-GSFC
CI - F.M. NEUBAUER	BRAUNSCHWEIG TECH U

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO INVESTIGATE THE MAGNETIC FIELDS OF JUPITER AND SATURN, THE SOLAR WIND INTERACTION WITH THE MAGNETOSPHERES OF THESE PLANETS, AND THE INTERPLANETARY MAGNETIC FIELD TO THE EXTENT OF THE SOLAR WIND BOUNDARY WITH THE INTERSTELLAR MAGNETIC FIELD AND BEYOND, IF CROSSED. THE INVESTIGATION WAS CARRIED OUT USING TWO HIGH-FIELD AND TWO LOW-FIELD TRIAXIAL FLUXGATE MAGNETOMETERS. DATA ACCURACY OF THE INTERPLANETARY FIELDS WAS PLUS OR MINUS 0.1 NT, AND THE RANGE OF MEASUREMENTS IS FROM 0.01 NT TO 2.E-3 T.

----- VOYAGER 1, SCARF-----

INVESTIGATION NAME- PLASMA WAVE (.01-56 KHZ)

NSSDC ID- 77-084A-13

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS
PLANETARY IONOSPHERES

PERSONNEL

PI - F.L. SCARF	TRW SYSTEMS GROUP
CI - D.A. GURNETT	U OF IOWA

BRIEF DESCRIPTION

THIS INVESTIGATION PROVIDED CONTINUOUS, SHEATH-INDEPENDENT MEASUREMENTS OF THE ELECTRON DENSITY PROFILES AT JUPITER AND SATURN. IT ALSO GAVE BASIC INFORMATION ON LOCAL WAVE-PARTICLE INTERACTION REQUIRED TO CARRY OUT COMPARATIVE STUDIES OF THE PHYSICS OF THE JUPITER AND SATURN MAGNETOSPHERES. THE INSTRUMENTATION CONSISTED OF A 16-CHANNEL STEP FREQUENCY RECEIVER AND A LOW-FREQUENCY WAVEFORM RECEIVER WITH ASSOCIATED ELECTRONICS. THE FREQUENCY RANGE FOR THIS INSTRUMENT WAS FROM 10 HZ TO 56 KHZ. THIS INSTRUMENT SHARED THE 10-M ANTENNAS DEVELOPED FOR THE PLANETARY RADIO ASTRONOMY INVESTIGATION.

----- VOYAGER 1, SMITH-----

INVESTIGATION NAME- IMAGING

NSSDC ID- 77-084A-01

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL

TL - B.A. SMITH	U OF ARIZONA
DT - L.A. SODERBLOM	US GEOLOGICAL SURVEY
TM - G.A. BRIGGS	NASA HEADQUARTERS
TM - A.F. COOK	SAO
TM - G.E. DANIELSON	NASA-JPL
TM - M.E. DAVIES	RAND CORP
TM - G.E. HUNT	U COLLEGE LONDON
TM - T. OWEN	STATE U OF NEW YORK
TM - C. SAGAN	CORNELL U
TM - V.E. SUOMI	U OF WISCONSIN
TM - T.V. JOHNSON	NASA-JPL
TM - H. MASURSKY	US GEOLOGICAL SURVEY

BRIEF DESCRIPTION

THE PHOTOGRAPHIC EXPERIMENT USED A TWO-CAMERA SYSTEM, BASED ON THE MARINER 10 SYSTEM. THIS SYSTEM INCLUDED ONE NARROW-ANGLE, LONG FOCAL-LENGTH CAMERA AND ONE WIDE-ANGLE, SHORT FOCAL LENGTH CAMERA. THE MAXIMUM RESOLUTION ACHIEVABLE DEPENDED ON THE ACTUAL TRAJECTORY ON THIS MULTI-ENCOUNTER MISSION, BUT THE RESOLUTION WAS AS HIGH AS 0.5 TO 1.0 KM ON THE CLOSEST APPROACHES TO SOME OBJECTS. AT JUPITER AND SATURN, THE RESOLUTION WAS EXPECTED TO BE 20 KM AND 5 KM, RESPECTIVELY. THE OBJECTIVES OF THE EXPERIMENT WERE TO PHOTOGRAPH GLOBAL MOTIONS AND CLOUD DISTRIBUTIONS ON JUPITER AND SATURN, GROSS DYNAMICAL PROPERTIES, ZONAL ROTATION, ORIENTATION OF SPIN AXIS, ZONAL SHEAR, VERTICAL SHEAR, FLOW INSTABILITIES, SPOTS, AND SPECTRUM OF SCALE OF ATMOSPHERIC MOTIONS IN TIME AND SPACE. ADDITIONAL OBJECTIVES INCLUDED THE STUDY OF THE MODE OF RELEASE OF INTERNAL ENERGY FLUX (SEARCH FOR CONVECTION CELLS AND ROLLS), STUDY OF GROWTH, DISSIPATION, MORPHOLOGY, AND VERTICAL STRUCTURE OF CLOUD COMPLEXES, GROSS OPTICAL PROPERTIES, GLOBAL AND LOCALIZED SCATTERING FUNCTION IN THE VISIBLE SPECTRUM, POLARIMETRY, NATURE OF CHROMOPHORES, THEIR STRUCTURE AND DEVELOPMENT, AND HIGH RESOLUTION OF THE GREAT RED SPOT. THE OBJECTIVES OF THE SATELLITE ENCOUNTERS INCLUDED: (1) GROSS CHARACTERISTICS - SIZE, SHAPE, ROTATION, SPIN AXIS, CARTOGRAPHY, IMPROVED EPHEMERIDES AND MASSES, (2) GEOLOGY -- MAJOR PHYSIOGRAPHIC PROVINCES, IMPACT AND VOLCANIC FEATURES, LINEAMENTS, POLAR CAPS, EROSION PROCESSES, AND LOW- AND HIGH-DENSITY SATELLITE COMPARATIVE STUDIES, DETECTION OF ATMOSPHERES, FROSTS, AND LIMB STRATIFICATION OF AEROSOLS, (3) SURFACE PROPERTIES - COLORIMETRY, SCATTERING FUNCTION, NATURE OF BRIGHTNESS VARIATION, AND SEARCH FOR NEW SATELLITES. STUDIES OF SATURN'S RINGS INCLUDED: (1) RESOLUTION OF INDIVIDUAL RING COMPONENTS OR CLUMPS OF MATERIAL, (2) VERTICAL AND RADIAL DISTRIBUTION OF MATERIAL OF VERY HIGH RESOLUTION, (3) SCATTERING FUNCTION, (4) COARSE POLARIMETRY, (5) OCCULTATION - OPTICAL DEPTH, AND (6) DISTINGUISHING DIFFERENT TYPES OF MATERIAL IN THE RINGS. OTHER OBJECTIVES WERE TO SEARCH FOR NEW COMETS, ASTEROIDS, AND TARGETS OF OPPORTUNITY.

----- VOYAGER 1, VOGT-----

INVESTIGATION NAME- HIGH- AND MODERATELY LOW-ENERGY
COSMIC-RAY TELESCOPE

NSSDC ID- 77-084A-08

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - R.E. VOGT	CALIF INST OF TECH
CI - J.R. JOKIPII	U OF ARIZONA
CI - E.C. STONE	CALIF INST OF TECH
CI - F.B. McDONALD	NASA-GSFC
CI - J.H. TRAINER	NASA-GSFC
CI - W.R. WEBBER	U OF NEW HAMPSHIRE

BRIEF DESCRIPTION

THIS INVESTIGATION STUDIED THE ORIGIN AND ACCELERATION PROCESS, LIFE HISTORY, AND DYNAMIC CONTRIBUTION OF INTERSTELLAR COSMIC RAYS, THE NUCLEOSYNTHESIS OF ELEMENTS IN COSMIC-RAY SOURCES, THE BEHAVIOR OF COSMIC RAYS IN THE INTERPLANETARY MEDIUM, AND THE TRAPPED PLANETARY ENERGETIC PARTICLE ENVIRONMENT. THE INSTRUMENTATION INCLUDED A HIGH-ENERGY TELESCOPE SYSTEM (HETS) AND A LOW-ENERGY TELESCOPE SYSTEM (LETS). THE HETS COVERED AN ENERGY RANGE BETWEEN 6 AND 500 MEV/NUCLEON FOR NUCLEI RANGING IN ATOMIC NUMBERS FROM 1 THROUGH 30. IN ADDITION, ELECTRONS IN THE ENERGY RANGE BETWEEN 3 AND 100 MEV/NUCLEON WERE MEASURED BY THIS TELESCOPE AND AN ELECTRON TELESCOPE (TET). THE LETS MEASURED THE ENERGY AND DETERMINED THE IDENTITY OF NUCLEI FOR ENERGIES BETWEEN .15 AND 30 MEV/NUCLEON AND ATOMIC NUMBERS FROM 1 TO 30. THE INSTRUMENTS ALSO MEASURED THE ANISOTROPIES OF ELECTRONS AND NUCLEI. IN ADDITION, ELECTRONS IN THE ENERGY RANGE BETWEEN 3 AND 100 MEV/NUCLEON WERE MEASURED BY AN ELECTRON TELESCOPE (TET).

----- VOYAGER 1, WARWICK-----

INVESTIGATION NAME- PLANETARY RADIO ASTRONOMY

NSSDC ID- 77-084A-10

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS

PERSONNEL

PI - J.W. WARWICK	SCIENCE APPL, INC
CI - J.K. ALEXANDER, JR.	NASA-GSFC
CI - T.D. CARR	U OF FLORIDA
CI - F.T. HADDOCK	U OF MICHIGAN
CI - D.H. STAELIN	MASS INST OF TECH
CI - A. BOISCHOT	PARIS OBSERVATORY
CI - C.C. HARVEY	PARIS OBSERVATORY
CI - Y. LEBLANC	PARIS OBSERVATORY
CI - W.E. BROWN, JR.	NASA-JPL
CI - S. GULKIS	NASA-JPL
CI - R. PHILLIPS	NASA-JPL
CI - J.B. PEARCE	SCIENCE APPL, INC
CI - A.C. RIDDLE	SCIENCE APPL, INC
CI - R.G. PELTZER	U OF COLORADO

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A SWEEP-FREQUENCY RADIO RECEIVER OPERATING IN BOTH POLARIZATION STATES, BETWEEN 20 KHZ AND 40.5 MHZ. THE SIGNAL WAS RECEIVED BY A PAIR OF ORTHOGONAL 10-M MONOPOLE ANTENNAS. STUDY OF THE RADIO EMISSION SIGNALS FROM JUPITER AND SATURN OVER THIS RANGE OF FREQUENCIES YIELDED DATA CONCERNING THE PHYSICS OF MAGNETOSPHERIC PLASMA RESONANCES AND NONTHERMAL RADIO EMISSIONS FROM THESE PLANETARY REGIONS.

***** VOYAGER 2*****

SPACECRAFT COMMON NAME- VOYAGER 2

ALTERNATE NAMES- MARINER JUPITER/SATURN B, OUTER PLANETS B
MARINER 77B, MJS 77B
10271

NSSDC ID- 77-076A

LAUNCH DATE- 08/20/77

WEIGHT- 700. KG

LAUNCH SITE- CAPE CANAVERAL, UNITED STATES

LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY

UNITED STATES

NASA-OSS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- SATURN FLYBY

PERSONNEL

MG - R.A. MILLS	NASA HEADQUARTERS
SC - M.A. MITZ	NASA HEADQUARTERS
PM - R.L. HEACOCK	NASA-JPL
PS - E.C. STONE	CALIF INST OF TECH

BRIEF DESCRIPTION

THE OVERALL OBJECTIVES OF VOYAGER 2 WERE TO CONDUCT EXPLORATORY INVESTIGATIONS OF THE PLANETARY SYSTEMS OF JUPITER AND SATURN AND OF THE INTERPLANETARY MEDIUM OUT TO SATURN. PRIMARY EMPHASIS WAS PLACED ON COMPARATIVE STUDIES OF THESE TWO PLANETARY SYSTEMS BY OBTAINING (1) MEASUREMENTS OF THE ENVIRONMENT, ATMOSPHERE, AND BODY CHARACTERISTICS OF THE PLANETS AND ONE OR MORE OF THE SATELLITES OF EACH PLANET, (2) STUDIES OF THE NATURE OF THE RINGS OF SATURN, AND (3) EXPLORATION OF THE INTERPLANETARY (OR INTERSTELLAR) MEDIUM AT INCREASING DISTANCES FROM THE SUN. THESE OBJECTIVES WERE MET USING A VARIETY OF INSTRUMENTS AND METHODS INCLUDING IMAGING, A COHERENT S- AND X-BAND RF RECEIVER, AN IR INTERFEROMETER AND RADIOMETER, A UV SPECTROMETER, FLUXGATE MAGNETOMETERS, FARADAY CUPS, A CHARGED PARTICLE ANALYZER, PLASMA DETECTOR, PLASMA WAVE RADIO RECEIVER, COSMIC-RAY TELESCOPES, PHOTOPOLARIMETER, AND A SWEEP FREQUENCY RADIO RECEIVER. JUPITER CLOSE ENCOUNTER WAS ACHIEVED ON JULY 9, 1979.

----- VOYAGER 2, BRIDGE-----

INVESTIGATION NAME- PLASMA SPECTROMETERS

NSSDC ID- 77-076A-06

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - H.S. BRIDGE	MASS INST OF TECH
CI - A.J. LAZARUS	MASS INST OF TECH
CI - S. OLBERT	MASS INST OF TECH
CI - J.W. BELCHER	MASS INST OF TECH
CI - V.M. VASYLIUNAS	MPI-AERONOMY
CI - L.F. BURLAGA	NASA-GSFC
CI - J.H. BINSACK	MASS INST OF TECH
CI - G.L. SISCOE	U OF CALIF, LA
CI - A.J. HUNDHAUSEN	NATL CTR FOR ATMOS RES
CI - R.E. HARTLE	NASA-GSFC
CI - K.W. OGILVIE	NASA-GSFC
CI - J.D. SULLIVAN	MASS INST OF TECH
CI - C.M. YEATES	NASA-JPL

BRIEF DESCRIPTION

THE PLASMA INVESTIGATION MADE USE OF TWO FARADAY CUP DETECTORS, ONE POINTED ALONG THE EARTH-SPACECRAFT LINE AND ONE AT RIGHT ANGLES TO THIS LINE. THE EARTH-POINTING DETECTOR DETERMINED THE MACROSCOPIC PROPERTIES OF THE PLASMA IONS, OBTAINING ACCURATE VALUES OF THEIR VELOCITY, DENSITIES, AND PRESSURE. THREE SEQUENTIAL ENERGY SCANS WERE EMPLOYED WITH (DELTA E)/E EQUAL TO 29, 7.2, AND 1.8 PERCENT, ALLOWING A COVERAGE FROM SUBSONIC TO HIGHLY SUPERSONIC FLOW. THE SIDE-LOOKING FARADAY CUP MEASURED ELECTRONS IN THE ENERGY RANGE FROM 5 EV TO 1 KEV.

----- VOYAGER 2, BROADFOOT-----

INVESTIGATION NAME- ULTRAVIOLET SPECTROSCOPY

NSSDC ID- 77-076A-04

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.L. BROADFOOT
CI - A. DALGARNO
CI - J.C. MCCONNELL
CI - R.M. GOODY
CI - T.M. DONAHUE
CI - M.B. MCELROY
CI - M.J.S. BELTON
CI - D.F. STROBEL
CI - H.W. MOOS
CI - J.E. BLAMONT
CI - J.L. BERTAUX

KITT PEAK NATL OBS
SAO
YORK U
HARVARD U
U OF MICHIGAN
HARVARD U
KITT PEAK NATL OBS
US NAVAL RESEARCH LAB
JOHNS HOPKINS U
CNRS-SA
CNRS-SA

THERMAL PROPERTIES, AND SIZE OF PARTICLES IN SATURN'S RINGS WERE CONDUCTED. THE INTERFEROMETER HAD A SPECTRAL RANGE OF 200 TO 4000 1/CM, WHILE THE RADIOMETER RANGE COVERED 5000 TO 33,000 1/CM. THE INSTRUMENT USED A SINGLE PRIMARY MIRROR 51 CM IN DIAM. WITH A FIELD OF VIEW OF 0.25 DEG.

----- VOYAGER 2, KRIMIGIS-----

INVESTIGATION NAME- LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE

NSSDC ID- 77-076A-07

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - S.M. KRIMIGIS
CI - C.O. BOSTROM
CI - T.P. ARMSTRONG
CI - W.I. AXFORD
CI - G. GLOECKLER
CI - L.J. LANZENOTTI
CI - C.Y. FAN

APPLIED PHYSICS LAB
APPLIED PHYSICS LAB
U OF KANSAS
MPI-AERONOMY
U OF MARYLAND
BELL TELEPHONE LAB
U OF ARIZONA

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT WAS TO STUDY THE MAGNETOSPHERES OF JUPITER AND SATURN USING A LOW-ENERGY MAGNETOSPHERIC PARTICLE ANALYZER. THIS DETECTOR MADE MEASUREMENTS IN (1) THE DISTANT MAGNETOSPHERE AND BOW SHOCK OF JUPITER, (2) THE POSSIBLE MAGNETOSPHERE OF SATURN, AND (3) THE TRAPPED RADIATION BELTS IN THE VICINITY OF JUPITER. ADDITIONALLY, THIS DETECTOR WAS ABLE TO STUDY LOW-ENERGY PARTICLES IN THE INTERPLANETARY MEDIUM. THE ENERGY RANGE OF THIS DETECTOR WAS 10 KEV TO 1.1 MEV FOR ELECTRONS AND 10 KEV TO 150 MEV FOR IONS. DURING THE INTERPLANETARY CRUISE PERIOD, PROTONS, ALPHA PARTICLES, AND HEAVIER NUCLEI (Z FROM 3 TO 26) WERE SEPARATELY IDENTIFIED AND THEIR ENERGY MEASURED IN THE RANGE FROM 0.05 TO 30 MEV, USING A LOW-ENERGY PARTICLE TELESCOPE.

----- VOYAGER 2, LILLIE-----

INVESTIGATION NAME- MULTIFILTER PHOTOPOLARIMETER,
2200-7300 A

NSSDC ID- 77-076A-11

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST
PLANETARY ATMOSPHERES

PERSONNEL

PI - C.F. LILLIE
CI - C.W. HORD
CI - K. PANG
CI - J.E. HANSEN
CI - D.L. COFFEEN

U OF COLORADO
U OF COLORADO
SCIENCE APPL, INC
NASA-GISS
NASA-GISS

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF AN 8-IN. F/1.1 TELESCOPE, THAT SENT ITS OBSERVATIONS THROUGH A POLARIZER AND A FILTER FOR ONE OF EIGHT BANDS IN THE 2200- TO 7300-A SPECTRAL REGION, THEN ON TO A PHOTOMULTIPLIER TUBE. BY STUDY OF THESE EMISSION INTENSITY DATA, INFORMATION ON SURFACE TEXTURE AND COMPOSITION OF BOTH PLANETS (JUPITER AND SATURN) COULD BE OBTAINED, ALONG WITH INFORMATION OF SIZE DISTRIBUTION AND COMPOSITION OF SATURN'S RINGS AND INFORMATION ON ATMOSPHERIC SCATTERING PROPERTIES AND DENSITY FOR BOTH PLANETS. MOLECULAR SCALE HEIGHTS FOR BOTH PLANETS COULD ALSO BE DETERMINED FROM THESE DATA.

----- VOYAGER 2, NESS-----

INVESTIGATION NAME- TRIAXIAL FLUXGATE MAGNETOMETERS

NSSDC ID- 77-076A-05

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETARY MAGNETIC FIELD
PARTICLES AND FIELDS
INTERPLANETARY MAGNETIC FIELDS

PERSONNEL

PI - N.F. NESS
CI - R.P. LEPPING
CI - F.M. NEUBAUER
CI - K.W. BEHANNON
CI - L.F. BURLAGA
CI - M.H. ACUNA

NASA-GSFC
NASA-GSFC
BRAUNSCHWEIG TECH U
NASA-GSFC
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO INVESTIGATE THE MAGNETIC FIELDS OF JUPITER AND SATURN, THE SOLAR WIND INTERACTION WITH THE MAGNETOSPHERES OF THESE PLANETS, AND THE INTERPLANETARY MAGNETIC FIELD TO THE EXTENT OF THE SOLAR WIND BOUNDARY WITH THE INTERSTELLAR MAGNETIC FIELD, AND BEYOND, IF CROSSED. THE INVESTIGATION WAS CARRIED OUT USING TWO HIGH-FIELD AND TWO LOW-FIELD TRIAXIAL FLUXGATE MAGNETOMETERS. DATA ACCURACY OF

BRIEF DESCRIPTION

THE UV SPECTROMETER WAS DESIGNED TO MEASURE ATMOSPHERIC PROPERTIES AND MEASURED RADIATION IN THE WAVELENGTH RANGE FROM 400 TO 1600 A. TWO MODES OF INSTRUMENT OPERATION WERE PLANNED, AIRGLOW AND OCCULTATION. IN THE AIRGLOW MODE THE ATMOSPHERIC RADIATION WAS MEASURED. THIS RADIATION IS PREDOMINANTLY RESONANCE-SCATTERED SOLAR RADIATION, WHERE THE SCATTERING WILL BE BY THE MOLECULAR OR ATOMIC ATMOSPHERIC CONSTITUENTS SUCH AS, FOR EXAMPLE, HYDROGEN (1216 A) OR HELIUM (584 A). IN THE OCCULTATION MODE SUNLIGHT WAS REFLECTED INTO THE SPECTROMETER, AND THE SOLAR SPECTRUM WAS RECORDED. AS THE ATMOSPHERE MOVES BETWEEN THE SPACECRAFT AND THE SUN, THE ABSORPTION CHARACTERISTICS OF THE ATMOSPHERE WERE OBTAINED OVER THE MEASURED WAVELENGTH REGION. THE ABSORPTION SPECTRUM WAS USED TO IDENTIFY THE ABSORBER AS WELL AS TO MEASURE ITS ABUNDANCE IN THE LINE OF SIGHT TO THE SUN. IN ADDITION, THE ATMOSPHERE'S THERMAL STRUCTURE COULD BE INFERRED.

----- VOYAGER 2, ESHLEMAN-----

INVESTIGATION NAME- RADIO SCIENCE TEAM

NSSDC ID- 77-076A-02

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
CELESTIAL MECHANICS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

TL - V.R. ESHLEMAN
DT - G.L. TYLER
TM - G.F. LINDAL
TM - G.S. LEVY
TM - T.A. CROFT
TM - J.D. ANDERSON
TM - G.E. WOOD

STANFORD U
STANFORD U
NASA-JPL
NASA-JPL
SRI INTERNATIONAL
NASA-JPL
NASA-JPL

BRIEF DESCRIPTION

THE RADIO SCIENCE TEAM USED THE TELECOMMUNICATIONS SYSTEMS OF THE VOYAGER SPACECRAFT TO PERFORM THEIR STUDIES. THE SYSTEM WAS A COHERENT S- AND X-BAND DOWNLINK AND S-BAND UPLINK. THE SCIENCE OBJECTIVES OF THE RADIO SCIENCE INVESTIGATION WERE: (1) DETERMINE THE PHYSICAL PROPERTIES OF PLANETARY AND SATELLITE IONOSPHERES AND ATMOSPHERES BY EXAMINING THE PROPAGATION EFFECTS ON A DUAL-FREQUENCY RADIO SIGNAL DURING IMMERSION OF SPACECRAFT OCCULTATION BY THE SUBJECT BODY, (2) DETERMINE PLANETARY AND SATELLITE MASSES, GRAVITY FIELDS AND DENSITIES BY PRECISE TRACKING OF A DUAL-FREQUENCY RADIO SIGNAL FROM THE SPACECRAFT DURING THE ENCOUNTER PERIOD, AND (3) DETERMINE THE AMOUNT AND SIZE DISTRIBUTIONS OF MATERIAL IN SATURN'S RINGS AND THE RING DIMENSIONS BY EXAMINING THE PROPAGATION EFFECTS ON A DUAL-FREQUENCY RADIO SIGNAL THAT PASSES THROUGH EACH RING IN SUCCESSION AND THROUGH THE GAP BETWEEN THE C RING AND SATURN'S SURFACE.

----- VOYAGER 2, HANEL-----

INVESTIGATION NAME- INFRARED SPECTROSCOPY AND RADIOMETRY

NSSDC ID- 77-076A-03

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - R.A. HANEL
CI - C.A. PONNAMPERUMA
CI - P.J. GIERASCH
CI - J.A. PIRAGLIA
CI - R.E. SAMUELSON
CI - W.C. MAGUIRE
CI - J.C. PEARL
CI - V.G. KUNDE
CI - P.D. LOWMAN, JR.
CI - B.J. CONRATH
CI - D. GAUTIER

NASA-GSFC
U OF MARYLAND
CORNELL U
NASA-GSFC
NASA-GSFC
NASA-GSFC
NASA-GSFC
NASA-GSFC
NASA-GSFC
NASA-GSFC
PARIS OBSERVATORY

BRIEF DESCRIPTION

THIS INVESTIGATION WAS CARRIED OUT USING AN INFRARED RADIOMETER AND AN INTERFEROMETER SPECTROMETER SIMILAR IN DESIGN TO THE MARINER MARS-71 IRIS, COMBINED INTO A SINGLE INSTRUMENT. THE INVESTIGATION STUDIED BOTH GLOBAL AND LOCAL ENERGY BALANCE, USING INFRARED SPECTRAL MEASUREMENTS IN CONJUNCTION WITH BROAD-BAND MEASUREMENTS OF REFLECTED SOLAR ENERGY. ATMOSPHERIC COMPOSITION WAS ALSO INVESTIGATED, INCLUDING DETERMINATION OF THE H2/H2O RATIO, AND THE ABUNDANCE OF CH4 AND NH3. VERTICAL TEMPERATURE PROFILES WERE OBTAINED ON THE PLANETS AND SATELLITES WITH ATMOSPHERES. STUDIES OF THE COMPOSITION,

THE INTERPLANETARY FIELDS WAS PLUS OR MINUS 0.1 NT, AND THE RANGE OF MEASUREMENTS IS FROM 0.01 NT TO 2.E-3 T.

----- VOYAGER 2, SCARF-----

INVESTIGATION NAME- PLASMA WAVE (.01-56 KHZ)

NSSDC ID- 77-076A-13

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY IONOSPHERES
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - F.L. SCARF
CI - D.A. GURNETT

TRW SYSTEMS GROUP
U OF IOWA

BRIEF DESCRIPTION

THIS INVESTIGATION PROVIDED CONTINUOUS, SHEATH-INDEPENDENT MEASUREMENTS OF THE ELECTRON DENSITY PROFILES AT JUPITER AND SATURN. IT ALSO GAVE BASIC INFORMATION ON LOCAL WAVE-PARTICLE INTERACTIONS REQUIRED TO CARRY OUT COMPARATIVE STUDIES OF THE PHYSICS OF THE JUPITER AND SATURN MAGNETOSPHERES. THE INSTRUMENTATION CONSISTED OF A 16-CHANNEL STEP FREQUENCY RECEIVER AND A LOW-FREQUENCY WAVEFORM RECEIVER WITH ASSOCIATED ELECTRONICS. THE FREQUENCY RANGE FOR THIS INSTRUMENT WAS FROM 10 HZ TO 56 KHZ. THIS INSTRUMENT SHARED THE 10-M ANTENNAS DEVELOPED FOR THE PLANETARY RADIO ASTRONOMY INVESTIGATION.

----- VOYAGER 2, SMITH-----

INVESTIGATION NAME- IMAGING

NSSDC ID- 77-076A-01

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL

TL - B.A. SMITH
DT - L.A. SODERBLOM
TM - G.A. BRIGGS
TM - A.F. COOK
TM - G.E. DANIELSON
TM - M.E. DAVIES
TM - G.E. HUNT
TM - T. OWEN
TM - C. SAGAN
TM - V.E. SUOMI
TM - T.V. JOHNSON
TM - H. MASURSKY

U OF ARIZONA
US GEOLOGICAL SURVEY
NASA HEADQUARTERS
SAO
NASA-JPL
RAND CORP
U COLLEGE LONDON
STATE U OF NEW YORK
CORNELL U
U OF WISCONSIN
NASA-JPL
US GEOLOGICAL SURVEY

BRIEF DESCRIPTION

THE PHOTOGRAPHIC EXPERIMENT USED A TWO-CAMERA SYSTEM, BASED ON THE MARINER 10 SYSTEM. THIS SYSTEM INCLUDED ONE NARROW-ANGLE, LONG FOCAL-LENGTH CAMERA AND ONE WIDE-ANGLE, SHORT FOCAL-LENGTH CAMERA. THE MAXIMUM RESOLUTION ACHIEVABLE DEPENDED GREATLY ON THE ACTUAL TRAJECTORY ON THIS MULTI-ENCOUNTER MISSION, BUT WAS AS HIGH AS 0.5 TO 1.0 KM ON THE CLOSEST APPROACHES TO SOME OBJECTS. AT JUPITER AND SATURN, THE RESOLUTION WAS EXPECTED TO BE 20 KM AND 5 KM, RESPECTIVELY. THE OBJECTIVES OF THE EXPERIMENT WERE TO PHOTOGRAPH GLOBAL MOTIONS AND CLOUD DISTRIBUTIONS ON JUPITER AND SATURN, GROSS DYNAMICAL PROPERTIES, ZONAL ROTATION, ORIENTATION OF SPIN AXIS, ZONAL SHEAR, VERTICAL SHEAR, FLOW INSTABILITIES, SPOTS, AND SPECTRUM OF SCALE OF ATMOSPHERIC MOTIONS IN TIME AND SPACE. ADDITIONAL OBJECTIVES INCLUDED THE STUDY OF THE MODE OF RELEASE OF INTERNAL ENERGY FLUX (SEARCH FOR CONVECTION CELLS AND ROLLS), STUDY OF GROWTH, DISSIPATION, MORPHOLOGY, AND VERTICAL STRUCTURE OF CLOUD COMPLEXES, GROSS OPTICAL PROPERTIES, GLOBAL AND LOCALIZED SCATTERING FUNCTION IN THE VISIBLE SPECTRUM, POLARIMETRY, NATURE OF CHROMOPHORES, THEIR STRUCTURE AND DEVELOPMENT, HIGH RESOLUTION OF THE GREAT RED SPOT. THE OBJECTIVES OF THE SATELLITE ENCOUNTERS INCLUDED: GROSS CHARACTERISTICS -- SIZE, SHAPE, ROTATION, SPIN AXIS, CARTOGRAPHY, IMPROVED EPHEMERIDES AND MASSES; (2) GEOLOGY -- MAJOR PHYSIOGRAPHIC PROVINCES, IMPACT AND VOLCANIC FEATURES, LINEAMENTS, POLAR CAPS, EROSION PROCESSES, AND LOW- AND HIGH-DENSITY SATELLITE COMPARATIVE STUDIES, DETECTION OF ATMOSPHERES, FROSTS, AND LIMB STRATIFICATION OF AEROSOLS; (3) SURFACE PROPERTIES -- COLORIMETRY, SCATTERING FUNCTION, NATURE OF BRIGHTNESS VARIATION, AND SEARCH FOR NEW SATELLITES. STUDIES OF SATURN'S RINGS ARE TO BE CARRIED OUT. OBJECTIVES INCLUDE: (1) RESOLUTION OF INDIVIDUAL RING COMPONENTS OF CLUMPS OF MATERIAL; (2) VERTICAL AND RADIAL DISTRIBUTION OF MATERIAL OF VERY HIGH RESOLUTION; (3) SCATTERING FUNCTION; (4) COARSE POLARIMETRY; (5) OCCULTATION -- OPTICAL DEPTH; AND (6) DISTINGUISHING DIFFERENT TYPES OF MATERIAL IN THE RINGS. OTHER OBJECTIVES WERE TO SEARCH FOR NEW COMETS, ASTEROIDS, AND TARGETS OF OPPORTUNITY.

----- VOYAGER 2, VOGT-----

INVESTIGATION NAME- HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE

NSSDC ID- 77-076A-08

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - R.E. VOGT
CI - J.R. JOKIPII
CI - E.C. STONE
CI - F.B. McDONALD
CI - J.H. TRAINOR
CI - W.R. WEBBER

CALIF INST OF TECH
U OF ARIZONA
CALIF INST OF TECH
NASA-GSFC
NASA-GSFC
U OF NEW HAMPSHIRE

BRIEF DESCRIPTION

THIS INVESTIGATION STUDIED THE ORIGIN AND ACCELERATION PROCESS, LIFE HISTORY, AND DYNAMIC CONTRIBUTION OF INTERSTELLAR COSMIC RAYS, THE NUCLEOSYNTHESIS OF ELEMENTS IN COSMIC-RAY SOURCES, THE BEHAVIOR OF COSMIC RAYS IN THE INTERPLANETARY MEDIUM, AND THE TRAPPED PLANETARY ENERGETIC PARTICLE ENVIRONMENT. THE INSTRUMENTATION INCLUDED A HIGH-ENERGY TELESCOPE SYSTEM (HETS) AND A LOW-ENERGY TELESCOPE SYSTEM (LETS). THE HETS COVERED AN ENERGY RANGE BETWEEN 6 AND 500 MEV/NUCLEON FOR NUCLEI RANGING IN ATOMIC NUMBERS FROM 1 THROUGH 30. IN ADDITION ELECTRONS IN THE ENERGY RANGE BETWEEN 3 AND 100 MEV WERE MEASURED BY THIS TELESCOPE AND AN ELECTRON TELESCOPE (TET). THE LETS MEASURED THE ENERGY AND DETERMINED THE IDENTITY OF NUCLEI FOR ENERGIES BETWEEN .15 AND 30 MEV/NUCLEON AND ATOMIC NUMBERS FROM 1 TO 30. THE INSTRUMENTS ALSO MEASURED THE ANISOTROPIES OF ELECTRONS AND NUCLEI. IN ADDITION, ELECTRONS IN THE ENERGY RANGE BETWEEN 3 AND 100 MEV WERE MEASURED BY AN ELECTRON TELESCOPE (TET).

----- VOYAGER 2, WARWICK-----

INVESTIGATION NAME- PLANETARY RADIO ASTRONOMY

NSSDC ID- 77-076A-10

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS

PERSONNEL

PI - J.W. WARWICK
CI - W.E. BROWN, JR.
CI - S. GULKIS
CI - C.C. HARVEY
CI - Y. LEBLANC
CI - D.H. STAELIN
CI - A. BOISCHOT
CI - T.D. CARR
CI - F.T. HADDOCK
CI - J.K. ALEXANDER, JR.
CI - R. PHILLIPS
CI - R.G. PELTZER
CI - J.B. PEARCE
CI - R.G. PELTZER
CI - R. PHILLIPS
CI - R.G. PELTZER
CI - J.B. PEARCE
CI - A.C. RIDDLE

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PARIS OBSERVATORY
U OF FLORIDA
U OF MICHIGAN
NASA-GSFC
NASA-JPL
U OF COLORADO
SCIENCE APPL, INC
U OF COLORADO
NASA-JPL
U OF COLORADO
SCIENCE APPL, INC
SCIENCE APPL, INC

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A SWEEP-FREQUENCY RADIO RECEIVER OPERATING IN BOTH POLARIZATION STATES, BETWEEN 20 KHZ AND 40.5 MHZ. THE SIGNAL WAS RECEIVED BY A PAIR OF ORTHOGONAL 10-M MONOPOLE ANTENNAS. THE PHYSICS OF MAGNETOSPHERIC PLASMA RESONANCES AND NONTHERMAL RADIO EMISSIONS FROM THESE PLANETARY REGIONS WAS STUDIED BY INVESTIGATION OF THE RADIO EMISSION SIGNALS FROM JUPITER AND SATURN OVER THIS RANGE OF FREQUENCIES.

3

**DESCRIPTIONS OF PLANNED SPACECRAFT
AND EXPERIMENTS**

3. DESCRIPTIONS OF PLANNED SPACECRAFT AND EXPERIMENTS

This section contains descriptions of spacecraft and experiments pertinent to this report that were planned as of May 31, 1979, had progressed beyond the experiment or investigation selection stage, and for which NSSDC has at least minimal documentation. A few changes subsequent to this date may appear, depending on availability. The descriptions are sorted first by spacecraft common name. Within each spacecraft listing, experiments are ordered by the principal investigator's or team leader's last name. If the common name, as used by NSSDC, is not known, it can be found by referring to an alternate name found in the Index of Active and Planned Spacecraft and Experiments (Section 4).

Each spacecraft or experiment entry in this section is composed of two parts -- a heading and a brief description. The headings list characteristics of satellites and experiments. Definitions of many of the terms used in this section are included in Appendix C.

3.1 Contents of Spacecraft Entries

The heading for each spacecraft description in this section includes a set of planned orbit parameters. These parameters consist of orbit type, orbit period, apoapsis, periapsis, and inclination for the spacecraft. No orbit parameters are listed for lander, flyby, and probe missions. In addition, the heading contains the spacecraft weight, launch date, launch site, launch vehicle, spacecraft common and alternate names, NSSDC ID code, sponsoring country and agency, and spacecraft personnel:

CODE CO	(general contact)
CODE MG	(program manager)
CODE MM	(mission manager)
CODE MS	(mission scientist)
CODE PC	(project coordinator)
CODE PD	(project director)
CODE PE	(project engineer)
CODE PM	(project manager)
CODE PS	(project scientist)
CODE SC	(program scientist)
CODE TD	(technical director)

The spacecraft brief description is immediately below each heading. This terminology is standard for NASA missions; the equivalent functions for the missions of other countries and/or agencies have been given the same position names.

3.2 Contents of Experiment Entries

Each experiment entry heading includes the experiment name, the NSSDC ID code, the investigative program, the investigation discipline, and the name and affiliation or location of the principal investigator (PI) or team leader

(TL) for the experiment as well as other investigators (OI), team members (TM), deputy team leader (DT), co-investigator (CI), or general contact (CO) associated with the experiment. The experiment brief description is immediately below each heading.

The investigative program may include one of the following NASA Headquarters division codes:

CODE EB	(Environmental Observations Division)
CODE EC	(Communications Division)
CODE EM	(Space Processing Division)
CODE ER	(Resource Observations Division)
CODE RS	(Space Systems Division)
CODE SB	(Life Sciences Division)
CODE SC	(Astrophysics Division)
CODE SL	(Planetary Division)
CODE ST	(Solar Terrestrial Division)

The addition of /CO-OP to any code indicates a cooperative effort between NASA and a second party.

3.3 Planned Spacecraft and Experiment Descriptions

A spacecraft is included in the planned section of this report if it is an approved mission or a proposed mission where the experiments or investigations have already been selected.

***** ASTRO-A*****

SPACECRAFT COMMON NAME- ASTRO-A
ALTERNATE NAMES- ASTRONOMICAL SATELLITE-A

NSSDC ID- ASTRO-A

LAUNCH DATE- 02/00/81
LAUNCH SITE- KAGOSHIMA, JAPAN
LAUNCH VEHICLE- M-3S

WEIGHT- 180. KG

SPONSORING COUNTRY/AGENCY
JAPAN ISAS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 94.2 MIN
PERIAPSIS- 350. KM ALT
INCLINATION- 31. DEG
APOAPSIS- 600. KM ALT

PERSONNEL
PI - Y. TANAKA U OF TOKYO
PS - Z. SUENOTO U OF TOKYO

BRIEF DESCRIPTION
THE MAIN OBJECTIVE OF THE ASTRO-A MISSION IS THE DETAILED STUDY OF SOLAR FLARES DURING THE NEXT SOLAR MAXIMUM PERIOD. PRINCIPAL INVESTIGATIONS ARE: (1) IMAGING OF SOLAR FLARE X-RAYS IN THE RANGE 10-60 KEV BY MEANS OF ROTATING MODULATION COLLIMATORS, AND (2) SPECTROSCOPY OF X-RAY EMISSION LINES FROM HIGHLY IONIZED IRON IN SOLAR FLARES IN THE RANGE 1.5-2.0 A BY MEANS OF A BRAGG SPECTROMETER. WAVE LENGTH SCANNING IS ACHIEVED BY THE SPACECRAFT REVOLUTION WITH AN OFFSET POINTING OF THE SPIN AXIS WITH RESPECT TO THE SUN. INVESTIGATIONS (1) AND (2) EACH HAVE A TIME RESOLUTION OF 6 S. IN ADDITION, THE FOLLOWING INVESTIGATIONS ARE INCLUDED: THREE SOLAR FLARE X-RAY MONITORS THAT RECORD THE TIME PROFILE AND SPECTRUM OF THE X-RAY FLARES IN THE RANGE 2-60 KEV, A SOLAR FLARE GAMMA-RAY DETECTOR FOR THE RANGE 0.4-7 MEV, A PARTICLE DETECTOR THAT MONITORS ELECTRON FLUX ABOVE 100 KEV, AND PLASMA PROBES FOR THE MEASUREMENT OF ELECTRON DENSITY AND TEMPERATURE.

----- ASTRO-A, HIRAO-----

INVESTIGATION NAME- ELECTRON DENSITY AND TEMPERATURE PLASMA PROBES

NSSDC ID- ASTRO-A-06
INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE
INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
SPACE PLASMAS

PERSONNEL
PI - K. HIRAO U OF TOKYO
PI - H. OYA U OF TOHOKU
OI - K. OYAMA U OF TOKYO
OI - T. TAKAHASHI U OF TOHOKU

BRIEF DESCRIPTION
THIS EXPERIMENT USES PLASMA PROBES TO MEASURE ELECTRON DENSITY AND ELECTRON TEMPERATURE DURING THE SOLAR MAXIMUM PERIOD.

----- ASTRO-A, KONDO-----

INVESTIGATION NAME- SOLAR FLARE GAMMA-RAY DETECTOR IN 0.4-7 MEV RANGE

NSSDC ID- ASTRO-A-04
INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - I. KONDO U OF TOKYO
PI - K. OKUDAIRA RIKKYO U
OI - Y. HIRASHIMA RIKKYO U
OI - M. YOSHIMORI RIKKYO U

BRIEF DESCRIPTION
THIS EXPERIMENT MEASURES GAMMA RAYS FROM SOLAR FLARES IN THE ENERGY RANGE OF 0.4-7.0 MEV.

----- ASTRO-A, MATSUOKA-----

INVESTIGATION NAME- TIME PROFILE AND SPECTRA OF X-RAY FLARES IN THE 2-60 KEV RANGE

NSSDC ID- ASTRO-A-03
INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - M. MATSUOKA U OF TOKYO
OI - K. KOYAMA U OF TOKYO
OI - H. INOUE U OF TOKYO

BRIEF DESCRIPTION
THIS EXPERIMENT USES X-RAY MONITORS TO RECORD TIME PROFILES AND SPECTRUM OF SOLAR X-RAY FLARES IN THE ENERGY RANGE OF 2-60 KEV.

----- ASTRO-A, NISHI-----

INVESTIGATION NAME- SOLAR FLARE X-RAY BRAGG SPECTROSCOPY IN 1.5-2.0 A RANGE

NSSDC ID- ASTRO-A-02
INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - K. NISHI U OF TOKYO
OI - F. MORIYAMA U OF TOKYO
OI - K. TANAKA U OF TOKYO

BRIEF DESCRIPTION
THIS EXPERIMENT USES A BRAGG SPECTROMETER TO STUDY THE SPECTROSCOPY OF X-RAY EMISSION LINES FROM HIGHLY IONIZED IRON IN SOLAR FLARES. THE SPECTRUM COVERED IS IN THE RANGE OF 1.5-2.0 A. WAVE-LENGTH SCANNING IS ACHIEVED BY SPACECRAFT ROTATION WITH THE SPIN-AXIS OFFSET SLIGHTLY FROM THE SUN. THE TIME RESOLUTION IS 6 S.

----- ASTRO-A, TAKAKURA-----

INVESTIGATION NAME- SOLAR FLARE X-RAYS IN RANGE OF 10-60 KEV USING ROTATING COLLIMATOR IMAGING

NSSDC ID- ASTRO-A-01
INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - T. TAKAKURA U OF TOKYO
OI - S. MIYAMOTO OSAKA CITY U
OI - Y. OGAWARA U OF TOKYO
OI - K. OKI U OF TOKYO
OI - T. MURAKAMI U OF TOKYO

BRIEF DESCRIPTION
THIS EXPERIMENT USES ROTATING MODULATION COLLIMATORS TO IMAGE SOLAR FLARE X RAYS IN THE ENERGY RANGE OF 10 TO 60 KEV. THE TIME RESOLUTION IS 6 S.

----- ASTRO-A, TAKEUCHI-----

INVESTIGATION NAME- ELECTRON FLUX ABOVE 100 KEV PARTICLE DETECTOR MONITOR

NSSDC ID- ASTRO-A-05
INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - H. TAKEUCHI INST PHYS + CHEM RES
OI - T. IMAI INST PHYS + CHEM RES

BRIEF DESCRIPTION
THIS EXPERIMENT USES A PARTICLE DETECTOR TO MONITOR SOLAR ELECTRON FLUX ABOVE 100 KEV.

***** CCE*****

SPACECRAFT COMMON NAME- CCE
ALTERNATE NAMES- AMPTE/CHARGE COMP EXPL, CHARGE COMPOSITION EXP

NSSDC ID- CCE

LAUNCH DATE- 03/00/83
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

WEIGHT- 55. KG

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 952.6 MIN
PERIAPSIS- 200. KM ALT
INCLINATION- 2. DEG
APOAPSIS- 51000. KM ALT

PERSONNEL

MG - F.W. GAETANO
 SC - E.R. SCHMERLING
 PM - G.W. OUSLEY
 PS - M.H. ACUNA

NASA HEADQUARTERS
 NASA HEADQUARTERS
 NASA-GSFC
 NASA-GSFC

BRIEF DESCRIPTION

THE PURPOSES OF THIS MISSION ARE TO STUDY THE ACCESS OF SOLAR WIND IONS TO THE MAGNETOSPHERE AND THE CONVECTIVE-DIFFUSIVE TRANSPORT AND ENERGIZATION OF MAGNETOSPHERIC PARTICLES. THE PROGRAM CONSISTS OF THIS SPACECRAFT AND THE IRM SPACECRAFT USED TO RELEASE THREE SEPARATE ION RELEASES, WHICH WILL BE DETECTED BY INSTRUMENTS ON THE CCE. THE SPACECRAFT IS POWERED BY FOUR SOLAR CELL PANELS THAT PROVIDED 77 W, AND HAS A BATTERY. THE SPACECRAFT IS SPIN STABILIZED AT 10 RPM WITH THE SPIN AXIS IN THE ORBIT PLANE. THE ATTITUDE SYSTEM CONSISTS OF A SUN SENSOR AND A 3-AXIS MAGNETOMETER. THE THERMAL CONTROL IS PASSIVE. THE TELEMETRY SYSTEM IS A 1-W, S-BAND TRANSMITTER WITH TWO OPPOSITELY POLARIZED ANTENNAS. THE VECTOR MAGNETOMETER IS ALSO USED TO DETERMINE THE PITCH ANGLES OF THE PARTICLES MEASURED BY THE THREE INSTRUMENTS, WHICH ARE PROVIDED BY THE INVESTIGATORS. THE SCIENTIFIC TEAM IS LISTED IN APPENDIX B.

----- CCE, GLOECKLER-----

INVESTIGATION NAME- CHARGE-ENERGY-MASS SPECTROMETER(CHEM)

NSSDC ID- CCE -03

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - G. GLOECKLER U OF MARYLAND
 OI - D.K. HOVESTADT MPI-EXTRATERR PHYS
 OI - G. PASCHMANN MPI-EXTRATERR PHYS
 OI - B. WILKEN MPI-AERONOMY
 OI - W.I. AXFORD MPI-AERONOMY

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTS OF AN ENTRANCE COLLIMATOR AND AN ELECTROSTATIC ANALYZER SECTION, FOLLOWED BY A TIME-OF-FLIGHT AND TOTAL ENERGY MEASUREMENT. THE ENERGY RANGE COVERED IS FROM 2 TO 200 KEV/Q WITH A GEOMETRIC FACTOR OF 2.E-03 SQ CM-SR. ENERGY RESOLUTION IS 5 PERCENT, AND ALL CHARGE STATES AND ISOTOPES OF H AND HE, LI WITH ITS CHARGE STATES, AND MAJOR ELEMENTS AND CHARGE STATES UP TO AND INCLUDING FE ARE RESOLVED.

----- CCE, MCENTIRE-----

INVESTIGATION NAME- MEDIUM ENERGY PARTICLE ANALYZER (MEPA)

NSSDC ID- CCE -02

INVESTIGATIVE PROGRAM
CODE STINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS

PERSONNEL

PI - R.W. MCENTIRE APPLIED PHYSICS LAB
 OI - S.W. KRIMIGIS APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTS OF A SOLID STATE DETECTOR TELESCOPE WITH A THIN FRONT ELEMENT AND A 7.5 CM SEPARATION BETWEEN THE FRONT AND REAR DETECTORS. PARTICLE DE/DX IS MEASURED IN THE FRONT DETECTOR, TIME OF FLIGHT IS MEASURED BETWEEN THE TWO DETECTORS, AND RESIDUAL PARTICLE ENERGY IS MEASURED IN THE REAR DETECTOR. THE PARTICLE CHARGE RANGE IS GREATER THAN OR EQUAL TO 3 AND THE ENERGY RANGE IS 0.1 TO 10 MEV/NUCLEON.

----- CCE, SHELLEY-----

INVESTIGATION NAME- PLASMA COMPOSITION

NSSDC ID- CCE -01

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - E.G. SHELLEY LOCKHEED PALO ALTO
 OI - R.D. SHARP LOCKHEED PALO ALTO
 OI - G. HAERENDEL MPI-EXTRATERR PHYS
 OI - H.R. ROSENBAUER MPI-AERONOMY
 OI - R.G. JOHNSON LOCKHEED PALO ALTO
 OI - P.X. EBERHARDT U OF BERNE
 OI - H. BALSIGER U OF BERNE
 OI - J. GEISS U OF BERNE
 OI - D.T. YOUNG U OF BERNE
 OI - A. GHIELMETTI U OF BERNE

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTS OF AN ENTRANCE COLLIMATOR AND RETARDING POTENTIAL ANALYZER, A CURVED-PLATE ELECTROSTATIC ENERGY ANALYZER, AND A COMBINED ELECTROSTATIC-MAGNETIC MASS ANALYZER IN SERIES. THE ENERGY RANGE COVERED IS 0 TO 17 KEV/Q WITH A GEOMETRIC FACTOR RANGING FROM 2 TO 5 X 1.E-02 SQ CM-SR, AN ENERGY RESOLUTION OF 5 PERCENT, AND A MASS/Q RESOLUTION OF 25 PERCENT. THIS INSTRUMENT CLEANLY SEPARATES LI + AND EU + TRACER IONS FROM THE BACKGROUND. IT IS NEARLY IDENTICAL TO THE ONE FLOWN ON ISEE 1 BY THE SAME GROUP OF INVESTIGATORS.

***** COBE*****

SPACECRAFT COMMON NAME- COBE

ALTERNATE NAMES- COSMIC BACKGROUND EXPL

NSSDC ID- COBE

LAUNCH DATE- 10/01/85

WEIGHT- 1200. KG

LAUNCH SITE- VANDENBERG AFB, UNITED STATES

LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY

UNITED STATES

NASA-OSS

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC

ORBIT PERIOD- 103. MIN

PERIAPSIS- 900. KM ALT

INCLINATION- 99. DEG

APOAPSIS- 900. KM ALT

PERSONNEL

MG - J.D. ROSENDAHL NASA HEADQUARTERS
 MG - L. DONDEY NASA HEADQUARTERS
 SC - N.W. BOGGESS NASA HEADQUARTERS
 PM - G.W. LONGANECKER NASA-GSFC
 PS - J.C. MATHER NASA-GSFC

BRIEF DESCRIPTION

THE PURPOSE OF THE COBE MISSION IS TO TAKE PRECISE MEASUREMENTS OF THE DIFFUSE RADIATION BETWEEN 1 MICROMETERS AND 13 MM OVER THE WHOLE CELESTIAL SPHERE. THE FOLLOWING QUANTITIES ARE MEASURED: (1) THE SPECTRUM OF THE 3 K RADIATION OVER THE RANGE 0.1 TO 10 MM, (2) THE ISOTROPY OF THIS RADIATION FROM 3.3 TO 13 MM, AND (3) THE SPECTRUM AND ANGULAR DISTRIBUTION FROM 2 TO 300 MICROMETERS. THE SPACECRAFT CONSISTS OF A 600-KG MODIFIED AEM BASE MODULE TO WHICH A LARGE 600-KG CONICAL SUN SHADE/GROUND PLANE EXPERIMENT MODULE IS ATTACHED. THE EXPERIMENT MODULE CONTAINS A LIQUID HE DEWAR FILLED WITH 70 KG OF 2 K SUPERFLUID. THE TWO MODULES ROTATE AT ONE RPM ABOUT THE AXIS OF CONICAL SYMMETRY; THE ORIENTATION OF THE SPIN AXIS IS MAINTAINED ANTI-EARTH AND AT 91 DEG TO THE SUN/EARTH LINE. THE SPACECRAFT IS A 12-SIDED POLYHEDRON THAT HAS SOLAR PANELS ON EACH SIDE TO SUPPLY AN ORBIT-AVERAGED POWER OF 170 W. THE COMMUNICATIONS AND DATA HANDLING SYSTEM PROVIDES FOR CONTROL OF ALL SPACECRAFT AND EXPERIMENT FUNCTIONS. A NASA STANDARD TDRS TRANSPONDER IS USED FOR COMMAND, TELEMETRY, AND TRACKING. TRANSMISSION OF DATA IS THROUGH A BOOM-MOUNTED S-BAND PHASED-ARRAY ANTENNA DEPLOYED ALONG THE SPIN AXIS, EITHER IN REAL TIME OR FROM A BUBBLE MEMORY STORAGE SYSTEM. THE SPACECRAFT ALSO HOUSES A PROPULSION SYSTEM THAT BOOSTS IT FROM ITS 300-KM ALTITUDE SHUTTLE PARKING ORBIT TO THE 900-KM ALTITUDE OPERATIONAL VALUE. THE OPERATIONAL ORBIT IS A DAWN-DUSK SUN-SYNCHRONOUS ONE SO THAT THE SUN IS ALWAYS TO THE SIDE AND CAN BE SHIELDED FROM THE INSTRUMENTS. WITH THIS ORBIT AND THE SPIN AXIS ORIENTATION, THE INSTRUMENTS PERFORM A COMPLETE SCAN OF THE CELESTIAL SPHERE EVERY 6 MONTHS OR TWICE DURING THE 1-YR LIFETIME OF THE LIQUID HE. THE SPIN AND SYMMETRICAL CONFIGURATION ELIMINATE LOCAL THERMAL EFFECTS THAT COULD BIAS THE DATA. LOW-CONDUCTANCE SUPPORTS AND MULTILAYERED INSULATION ARE USED TO DECOUPLE THE SPACECRAFT AND EXPERIMENT MODULES.

----- COBE, HAUSER-----

INVESTIGATION NAME- DIFFUSE INFRARED BACKGROUND EXPERIMENT (DIRBE)

NSSDC ID- COBE -02

INVESTIGATIVE PROGRAM
CODE SCINVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - M.G. HAUSER NASA-GSFC
 OI - J.C. MATHER NASA-GSFC
 OI - D.T. WILKINSON PRINCETON U
 OI - S. GULKIS NASA-JPL
 OI - R. WEISS MASS INST OF TECH
 OI - G.F. SHOOT LAWRENCE BERKELEY LAB

BRIEF DESCRIPTION

THE DIFFUSE IR BACKGROUND EXPERIMENT (DIRBE) CONSISTS OF A CRYOGENICALLY COOLED (TO 2 K) MULTIBAND RADIOMETER USED TO INVESTIGATE DIFFUSE MID-INFRARED RADIATION FROM 2 TO 300 MICROMETERS. THE INSTRUMENT MEASURES THE ABSOLUTE FLUX IN 8 OCTAVE WAVELENGTH BANDS WITH A 1-DEG FIELD OF VIEW POINTED 30 DEG OFF THE SPIN AXIS. DETECTORS (PHOTOCONDUCTORS) AND FILTERS FOR THE 8-120 MICROMETER CHANNELS ARE THE SAME AS FOR THE IRAS MISSION. COMPOSITE BOLOMETERS ARE USED FOR THE ADDITIONAL LONG WAVELENGTH CHANNELS. SENSITIVITY OF THE DEVICE IS 3.E-16 W/SQ CM-SR-MICROMETER AT 300 MICROMETERS, RISING TO 1.E-13 W/SQ CM-SR-MICROMETER AT 8 MICROMETERS. THE TELESCOPE IS WELL

BAFFLED TO PREVENT STRAY LIGHT FROM ENTERING THE INSTRUMENT.

----- COBE, MATHER-----

INVESTIGATION NAME- FAR INFRARED ABSOLUTE SPECTROPHOTOMETER (FIRAS)

NSSDC ID- COBE -01 INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - J.C. MATHER	NASA-GSFC
01 - R. WEISS	MASS INST OF TECH
01 - M.G. HAUSER	NASA-GSFC
01 - D.T. WILKINSON	PRINCETON U
01 - G.F. SMOOT	LAWRENCE BERKELEY LAB
01 - S. GULKIS	NASA-JPL

BRIEF DESCRIPTION

THE FAR IN ABSOLUTE SPECTROPHOTOMETER (FIRAS) IS A CRYOGENICALLY COOLED POLARIZING MICHELSON INTERFEROMETER USED AS A FOURIER TRANSFORM SPECTROMETER. THE INSTRUMENT POINTS ALONG THE SPIN AXIS AND HAS A 7-DEG FIELD OF VIEW. THIS DEVICE MEASURES THE SPECTRUM TO A PRECISION OF 1/1000 OF THE PEAK FLUX AT 1.67 MM FOR EACH 7-DEG FIELD OF VIEW ON THE SKY (COVER THE RANGE 0.1 TO 10 MM). THE FIRAS USES A SPECIAL FLARED TRUMPET HORN FLUX COLLECTOR HAVING VERY LOW SIDELobe LEVELS, AN EXTERNAL CALIBRATOR COVERING THE ENTIRE BEAM, AND REQUIRES PRECISE TEMPERATURE REGULATION AND CALIBRATION. THE ENTIRE INSTRUMENT IS OPERATED AT A TEMPERATURE NEAR 3 K TO MATCH THE BACKGROUND TEMPERATURE. THIS FEATURE PROVIDES IMMUNITY FROM SYSTEMATIC ERRORS IN THE SPECTROMETER AND CONTRIBUTES SIGNIFICANTLY TO THE ABILITY TO DETECT SMALL DEVIATIONS FROM A BLACKBODY SPECTRUM. THE INSTRUMENT WEIGHS 30 KG, USES 18 W, AND HAS A DATA RATE OF 1000 BPS.

----- COBE, SMOOT-----

INVESTIGATION NAME- DIFFERENTIAL MICROWAVE RADIOMETERS (DMR)

NSSDC ID- COBE -03 INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - G.F. SMOOT	LAWRENCE BERKELEY LAB
01 - S. GULKIS	NASA-JPL
01 - D.T. WILKINSON	PRINCETON U
01 - J.C. MATHER	NASA-GSFC
01 - M.G. HAUSER	NASA-GSFC
01 - R. WEISS	MASS INST OF TECH

BRIEF DESCRIPTION

THE DIFFERENTIAL MICROWAVE RADIOMETER (DMR) INVESTIGATION USES FOUR DIFFERENTIAL RADIOMETERS TO MAP THE SKY AT 23.5, 31.4, 53, AND 90 GHZ. THE RADIOMETERS ARE DISTRIBUTED AROUND THE OUTER SURFACE OF THE CRYOSTAT. EACH RADIOMETER EMPLOYS A PAIR OF HORN ANTENNAE VIEWING AT 30 DEG FROM THE SPIN AXIS OF THE SPACECRAFT, MEASURING THE DIFFERENTIAL TEMPERATURE BETWEEN POINTS IN THE SKY SEPARATED BY 60 DEG. AT EACH FREQUENCY THERE ARE TWO CHANNELS FOR DUAL POLARIZATION MEASUREMENTS, FOR IMPROVED SENSITIVITY, AND FOR RELIABILITY. EACH RADIOMETER IS A MICROWAVE RECEIVER, WHOSE INPUT IS SWITCHED RAPIDLY BETWEEN THE TWO HORN ANTENNAE, OBTAINING THE DIFFERENCE IN BRIGHTNESS OF TWO FIELDS OF VIEW 7 DEG IN DIAMETER LOCATED 60 DEG APART AND 30 DEG FROM THE AXIS OF THE SPACECRAFT. HIGH SENSITIVITY IS ACHIEVED BY TEMPERATURE STABILIZATION (AT 300 K), BY SPACECRAFT SPIN, AND BY THE ABILITY TO INTEGRATE OVER THE ENTIRE YEAR. SENSITIVITY TO LARGE-SCALE ANISOTROPIES IS ABOUT 3×10^{-5} K.

***** DMSP-F4*****

SPACECRAFT COMMON NAME- DMSP-F4
ALTERNATE NAMES-

NSSDC ID- DMSP-F4

LAUNCH DATE- WEIGHT- 450. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- THOR

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

PERSONNEL

PM - W.D. MYER USAF-SAMSO

BRIEF DESCRIPTION

DMSP-F4 IS ONE OF A SERIES OF METEOROLOGICAL SATELLITES DEVELOPED AND OPERATED BY THE AIR FORCE UNDER THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM (DMSP). THIS PROGRAM, PREVIOUSLY KNOWN AS DAPP (DATA ACQUISITION AND PROCESSING PROGRAM), WAS CLASSIFIED UNTIL MARCH 1973. THE OBJECTIVES OF THIS PROGRAM ARE TO PROVIDE GLOBAL VISUAL AND INFRARED CLOUD COVER DATA AND SPECIALIZED ENVIRONMENTAL DATA TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS. OPERATIONALLY, THE PROGRAM

CONSISTS OF TWO SATELLITES IN 830-KM SUN-SYNCHRONOUS POLAR ORBITS, WITH THE ASCENDING NODE OF ONE SATELLITE IN EARLY MORNING AND THE OTHER AT LOCAL NOON. THE 5.4-M LONG SPACECRAFT IS SEPARATED INTO FOUR SECTIONS -- (1) A PRECISION MOUNTING PLATFORM (PMP) FOR SENSORS AND EQUIPMENT REQUIRING PRECISE ALIGNMENT, (2) AN EQUIPMENT SUPPORT MODULE (ESM) CONTAINING THE ELECTRONICS, REACTION WHEELS, AND SOME METEOROLOGICAL SENSORS, (3) A REACTION CONTROL EQUIPMENT (RCE) SUPPORT STRUCTURE (THAT HAS THE THIRD-STAGE MOTOR, HYDRAZINE REACTION CONTROL SYSTEM) THAT SUPPORTS (4) A 9.29 SQ METER SOLAR CELL PANEL. THE SPACECRAFT STABILIZATION IS CONTROLLED BY A COMBINATION FLYWHEEL AND MAGNETIC CONTROL COIL SYSTEM SO SENSORS ARE MAINTAINED IN THE DESIRED 'EARTH-LOOKING' MODE. ONE FEATURE IS THE PRECISION-POINTING ACCURACY OF THE PRIMARY IMAGER TO 0.01 DEG PROVIDED BY A STAR SENSOR AND UPDATED EPHEMERIS NAVIGATION SYSTEM. THIS ALLOWS AUTOMATIC GEOGRAPHICAL MAPPING OF THE DIGITAL IMAGERY TO THE NEAREST PICTURE ELEMENT. THE OPERATIONAL LINE SCAN SYSTEM (OLS) BUILT BY WESTINGHOUSE, IS THE PRIMARY DATA ACQUISITION SYSTEM THAT PROVIDES REAL-TIME OR STORED, MULTI-ORBIT, DAY-AND-NIGHT VISUAL AND INFRARED IMAGERY AT 1/3 NAUTICAL MILE RESOLUTION FOR ALL MAJOR LAND MASSES, 1-1/2 NAUTICAL MILE RESOLUTION FOR COMPLETE GLOBAL COVERAGE, AND PROVIDES WITH THIS DATA CALIBRATION, TIMING, AND OTHER AUXILIARY SIGNALS TO THE SPACECRAFT FOR DIGITAL TRANSMISSION TO THE GROUND. A SUPPLEMENTARY SENSOR PACKAGE, THE SPECIAL SENSOR H (SSH), A STEP-SCANNING RADIOMETER, IS THE INFRARED TEMPERATURE-HUMIDITY-OZONE SOUNDER. THE DATA PROCESSING SYSTEM, WHICH INCLUDES THREE HIGH-DENSITY TAPE RECORDERS, IS CAPABLE OF STORING A TOTAL OF 400 MIN OF DATA, EACH ALLOWING FULL GLOBAL COVERAGE TWICE DAILY. EITHER RECORDED OR REAL-TIME DATA ARE TRANSMITTED TO GROUND-RECEIVING SITES BY TWO REDUNDANT S-BAND TRANSMITTERS. RECORDED DATA ARE READ OUT TO TRACKING SITES LOCATED AT FAIRCHILD AFB, WA, AND LORING AFB, ME, AND RELAYED BY SATCOM TO AIR FORCE GLOBAL WEATHER CENTRAL, OFFUTT AFB, NE. REAL-TIME DATA ARE READ OUT AT MOBILE TACTICAL SITES LOCATED AROUND THE WORLD. A MORE COMPLETE DESCRIPTION OF THE SATELLITE CAN BE FOUND IN THE REPORT, 'THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, 4, JULY - AUGUST 1975.

----- DMSP-F4, AFGWC STAFF-----

INVESTIGATION NAME- OPERATIONAL LINESCAN SYSTEM (OLS)

NSSDC ID- DMSP-F4-01 INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SYS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION

THE OPERATIONAL LINESCAN SYSTEM (OLS) IS THE PRIMARY EXPERIMENT ON THE DMSP-F4 SPACECRAFT. THE PURPOSE OF THIS EXPERIMENT IS TO PROVIDE GLOBAL, DAY/NIGHT OBSERVATIONS OF CLOUD COVER AND CLOUD TEMPERATURE MEASUREMENTS TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS FOR OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE OLS EMPLOYS A SCANNING OPTICAL TELESCOPE DRIVEN IN AN OSCILLATING MOTION, WITH OPTICAL COMPENSATION FOR IMAGE MOTION, WHICH RESULTS IN NEAR-CONSTANT RESOLUTION THROUGHOUT THE SENSOR FIELD OF VIEW. THE RADIOMETER OPERATES IN TWO ('LIGHT' AND 'THERMAL') SPECTRAL INTERVALS -- (1) VISIBLE AND NEAR INFRARED (0.4 TO 1.1 MICROMETERS) AND (2) INFRARED (8 TO 13 MICROMETERS). THE RADIOMETER PRODUCES, WITH ONBOARD PROCESSING, DATA IN FOUR MODES -- LF (LIGHT FINE) AND TF (THERMAL FINE) DATA WITH A RESOLUTION OF .56 KM AND LS (LIGHT SMOOTHED) AND TS (THERMAL SMOOTHED) DATA WITH A RESOLUTION OF 2.8 KM. EACH OF THREE ONBOARD RECORDERS HAS A STORAGE CAPABILITY OF 400 MIN OF BOTH LS AND TS DATA OR 20 MIN OF LF AND TF DATA. FOR DIRECT READOUT TO TACTICAL SITES, THE EXPERIMENT IS PROGRAMMED SO THAT LF AND TS DATA ARE OBTAINED AT NIGHT. THE INFRARED DATA (TF AND TS) COVERS A TEMPERATURE RANGE OF 210 TO 310 K WITH AN ACCURACY OF 1 DEG C. THE LS DATA MODE PROVIDES VISUAL DATA THROUGH A DYNAMIC RANGE FROM FULL SUNLIGHT DOWN TO A QUARTER MOON. THIS MODE ALSO AUTOMATICALLY ADJUSTS THE GAIN ALONG SCAN TO ALLOW USEFUL DATA TO BE OBTAINED ACROSS THE TERMINATOR. ADDITIONAL INFORMATION OF THIS EXPERIMENT IS CONTAINED IN THE REPORT, 'PRIMARY OPTICAL SUBSYSTEMS FOR DMSP,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, JULY - AUGUST 1975.

----- DMSP-F4, AFGWC STAFF-----

INVESTIGATION NAME- VERTICAL TEMPERATURE PROFILE RADIOMETER
SPECIAL SENSOR H (SSH)

NSSDC ID- DMSP-F4-02 INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SYS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION

SPECIAL SENSOR H (SSH) IS A VERTICAL TEMPERATURE PROFILE RADIOMETER (VTPR). THE OBJECTIVE OF THIS EXPERIMENT IS TO OBTAIN VERTICAL TEMPERATURE, WATER VAPOR, AND OZONE PROFILES OF THE ATMOSPHERE TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE SSH IS A 16-CHANNEL SENSOR WITH ONE CHANNEL (1022 CM-1) IN THE 10-MICROMETER OZONE ABSORPTION BAND, ONE CHANNEL (835 CM-1) IN THE 12-MICROMETER ATMOSPHERIC WINDOW, SIX CHANNELS (747, 725, 708, 695, 676, 668.5 CM-1) IN THE 15-MICROMETER CO2 ABSORPTION BAND, AND EIGHT CHANNELS (535, 408.5, 441.5, 420, 374, 397.5, 355, 353.5 CM-1) IN THE 22- TO 30-MICROMETER ROTATIONAL WATER VAPOR ABSORPTION BAND. THE EXPERIMENT CONSISTS OF AN OPTICAL SYSTEM, DETECTOR AND ASSOCIATED ELECTRONICS, AND A SCANNING MIRROR. THE SCANNING MIRROR IS STEPPED ACROSS THE SATELLITE SUBTRACK, ALLOWING THE SSH TO VIEW 25 SEPARATE COLUMNS OF THE ATMOSPHERE EVERY 32 S OVER A CROSS TRACK GROUND SWATH OF 2000 KM. WHILE THE SCANNING MIRROR IS STOPPED AT A SCENE STATION, THE CHANNEL FILTERS ARE SEQUENCED THROUGH THE FIELD OF VIEW. THE SURFACE RESOLUTION IS APPROXIMATELY 39 KM AT NADIR. THE RADIANCE DATA ARE TRANSFORMED INTO TEMPERATURE WATER VAPOR AND OZONE PROFILES BY A MATHEMATICAL INVERSION TECHNIQUE. A MORE COMPLETE DESCRIPTION OF THE EXPERIMENT CAN BE FOUND IN THE REPORT, 'DMSP SPECIAL METEOROLOGICAL SENSOR H, OPTICAL SUBSYSTEM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, 284-288, JULY-AUGUST 1975.

----- DMSP-F4, AFGWC STAFF-----

INVESTIGATION NAME- SSM/T-MICROWAVE TEMPERATURE SOUNDER

NSSDC ID- DMSP-F4-06 INVESTIGATIVE PROGRAM
 OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
 METEOROLOGY
 AERONOMY

PERSONNEL

PI - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION

THE SPECIAL SENSOR MICROWAVE/ TEMPERATURE SOUNDER IS A SEVEN-CHANNEL SCANNING RADIOMETER WHICH WILL MEASURE RADIATION IN THE 5- TO 6- MM WAVELENGTH (50-60 GHZ) REGION SPECIFICALLY 50.5, 53.2, 54.35, 54.9, 58.4, 58.825, AND 59.4 GHZ TO PROVIDE DATA FOR VERTICAL TEMPERATURES FROM THE EARTH'S SURFACE TO ABOVE 30 KM. IT IS DESIGNED TO SCAN IN SYNCHRONIZATION WITH THE SPECIAL SENSOR H PACKAGE AND WILL PROVIDE TEMPERATURE SOUNDINGS OVER PREVIOUSLY INACCESSIBLE CLOUDY REGIONS AND AT HIGHER ALTITUDES THAN ARE ATTAINABLE FROM THE SSH. THE SSM/T OPERATES IN THE ABSORPTION BAND OF MOLECULAR OXYGEN. BY CHOOSING FREQUENCIES WITH DIFFERENT ABSORPTION COEFFICIENTS ON THE WING OF THE OXYGEN ABSORPTION BAND, A SERIES OF WEIGHTING FUNCTIONS PEAKING AT PRESELECTED ALTITUDES IS OBTAINED. THE RADIOMETER SCANS ACROSS THE NADIR TRACK ON SEVEN SCAN POSITIONS AND TWO CALIBRATION POSITIONS (COLD SKY AND 300 DEG K). THE DWELL TIME FOR THE CROSSTRACK AND CALIBRATION POSITIONS IS 2.7 S EACH. THE TOTAL SCAN PERIOD IS 32 S. THE INSTRUMENT HAS AN INSTANTANEOUS FIELD OF VIEW OF 12 DEG AND SCANS PLUS OR MINUS 36 DEG FROM NADIR.

----- DMSP-F4, ROTHWELL-----

INVESTIGATION NAME- PRECIPITATING ELECTRON SPECTROMETER

NSSDC ID- DMSP-F4-03 INVESTIGATIVE PROGRAM
 OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
 AERONOMY
 PARTICLES AND FIELDS

PERSONNEL

PI - P.L. ROTHWELL USAF GEOPHYS LAB

BRIEF DESCRIPTION

THE SPECTROMETER CONSISTS OF TWO DIFFERENT-SIZED CYLINDRICAL ELECTROSTATIC ANALYZERS (ESA) USING CHANNELTRON ELECTRON MULTIPLIERS. THE ESA'S POINT TOWARD THE ZENITH IN ORDER TO MEASURE PRECIPITATING ELECTRONS. THE LARGE ESA HAS A FIELD OF VIEW (FOV) OF 1.6 BY 8.0 DEG WITH A DELTA E/E OF 0.04, WHILE THE SMALL ONE HAS A FOV OF 3.7 BY 4.8 DEG WITH A DELTA E/E OF 0.072. THE LARGE ESA COVERS THE RANGE FROM 1 TO 20 KEV AND THE OTHER ONE FROM 50 TO 1000 EV. A COMPLETE EIGHT-POINT SPECTRUM FROM EACH UNIT IS OBTAINED IN 1 S.

----- DMSP-F4, SAGALYN-----

INVESTIGATION NAME- IONOSPHERIC PLASMA MONITOR

NSSDC ID- DMSP-F4-05 INVESTIGATIVE PROGRAM
 OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 AERONOMY

PERSONNEL

PI - R.C. SAGALYN

USAF GEOPHYS LAB

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTS OF ONE SPHERICAL (SEA) AND ONE PLANAR (PEA) ELECTROSTATIC ANALYZER. THE SEA PROVIDES MEASUREMENTS OF ELECTRON DENSITIES FROM 10 TO 1.E6/CUBIC CM IN THE TEMPERATURE RANGE FROM 200 TO 15,000 K. THE PEA MEASURES ION TEMPERATURES IN THE SAME RANGE AS WELL AS THE AVERAGE ION MASS OVER THE RANGE 1 TO 35 U. THE PEA IS ORIENTED IN THE DIRECTION OF THE POSITIVE SPACECRAFT VELOCITY.

----- DMSP-F4, SNYDER-----

INVESTIGATION NAME- PASSIVE IONOSPHERIC MONITOR

NSSDC ID- DMSP-F4-04 INVESTIGATIVE PROGRAM
 OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
 IONOSPHERES

PERSONNEL

PI - A.L. SNYDER

USAF GEOPHYS LAB

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTS OF A HIGH-FREQUENCY RADIO RECEIVER CONNECTED TO A SHORT ANTENNA THAT SWEEPS FROM 1.3 TO 13.9 MHZ IN 100-KHZ STEPS. THE DEVICE IS USED TO MONITOR THE IONOSPHERIC BREAKTHROUGH FREQUENCY OF NOISE GENERATED BY MAN-MADE OR NATURAL SOURCES BELOW THE F2 LAYER TO OBTAIN THE CRITICAL FREQUENCY OF THIS LAYER (F0F2). THE F0F2 PARAMETER IS USED IN CONSTRUCTING ELECTRON-DENSITY PROFILES USED IN FORECASTING THE STATE OF THE IONOSPHERE. THE INSTRUMENT CAN DETECT ELECTRIC FIELDS DOWN TO 10 MICROVOLTS/M.

----- DMSP-F4, UNKNOWN-----

INVESTIGATION NAME- SSD - ATMOSPHERIC DENSITY SENSOR

NSSDC ID- DMSP-F4-07 INVESTIGATIVE PROGRAM
 OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
 METEOROLOGY
 AERONOMY

PERSONNEL

PI - UNKNOWN

BRIEF DESCRIPTION

THE SSD IS A LIMB-SCANNING ULTRAVIOLET SPECTROMETER WHICH MEASURES DAYGLOW EMISSIONS FROM O AND N2. THE WAVELENGTHS OF PRIMARY INTEREST ARE AT 1356 A AND 3371 A. ENERGETIC PHOTOELECTRONS ARE PRODUCED BY PHOTOIONIZATION OF NEUTRAL MOLECULES BY SOLAR EUV RADIATION. AS THESE FAST PHOTOELECTRONS LOSE ENERGY THROUGH COLLISIONS WITH NEUTRALS, THOSE WITH ENERGIES NEAR 16 EV EXCITE O AND N2 TO ELECTRONIC STATES OF ENERGY HIGHER THAN THE GROUND STATES. THE SUBSEQUENT DECAY TO THE GROUND STATE PRODUCES EMISSIONS MONITORED BY THE SSD. THE SSD WILL MEASURE LIGHT EMITTED BY MOLECULAR NITROGEN EXCITATION AT 1041 A AND 3371 A, ATOMIC OXYGEN AT 1356 A, AND SOLAR RADIATION AT 913 A. LIGHT WILL BE MONITORED WITH NARROW COLLIMATORS THAT PROVIDE A FIELD-OF-VIEW OF 0.1 DEG X 4 DEG. A FUNNELTRON AND PHOTOMULTIPLIER TUBE WILL DETECT THE LIGHT AFTER IT PASSES THROUGH THE COLLIMATOR. THE SSD WILL BE MECHANICALLY DRIVEN TO SCAN VERTICALLY THROUGH THE EARTH'S LIMB FROM 80 TO 480 KM. IT WILL PROVIDE APPROXIMATELY 50 SETS OF DENSITY PROFILES ON THE DAYLIGHT PORTION OF EACH ORBIT.

***** DMSP-F5*****

SPACECRAFT COMMON NAME- DMSP-F5

ALTERNATE NAMES-

NSSDC ID- DMSP-F5

LAUNCH DATE- WEIGHT- 450. KG
 LAUNCH SITE- VANDENBERG AFB, UNITED STATES
 LAUNCH VEHICLE- THOR

SPONSORING COUNTRY/AGENCY

UNITED STATES DOD-USAF

PERSONNEL

PM - W.D. MYER

USAF-SAMSO

BRIEF DESCRIPTION

DMSP-F5 IS ONE OF A SERIES OF METEOROLOGICAL SATELLITES DEVELOPED AND OPERATED BY THE AIR FORCE UNDER THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM (DMSP). THIS PROGRAM, PREVIOUSLY KNOWN AS DAPP (DATA ACQUISITION AND PROCESSING PROGRAM), WAS CLASSIFIED UNTIL MARCH 1973. THE OBJECTIVES OF THIS PROGRAM ARE TO PROVIDE GLOBAL VISUAL AND INFRARED CLOUD COVER DATA AND SPECIALIZED ENVIRONMENTAL DATA TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS. OPERATIONALLY, THE PROGRAM CONSISTS OF TWO SATELLITES IN 830-KM SUN-SYNCHRONOUS POLAR ORBITS, WITH THE ASCENDING NODE OF ONE SATELLITE IN EARLY MORNING AND THE OTHER AT LOCAL NOON. THE 5.4-M LONG SPACECRAFT IS SEPARATED INTO FOUR SECTIONS -- (1) A PRECISION MOUNTING PLATFORM (PNP) FOR SENSORS AND EQUIPMENT REQUIRING PRECISE ALIGNMENT, (2) AN EQUIPMENT SUPPORT MODULE (ESM) CONTAINING THE

ELECTRONICS, REACTION WHEELS, AND SOME METEOROLOGICAL SENSORS, (3) A REACTION CONTROL EQUIPMENT (RCE) SUPPORT STRUCTURE (THAT HAS THE THIRD-STAGE MOTOR, HYDRAZINE REACTION CONTROL SYSTEM) THAT SUPPORTS (4) A 9.29 SQ M SOLAR CELL PANEL. THE SPACECRAFT STABILIZATION IS CONTROLLED BY A COMBINATION FLYWHEEL AND MAGNETIC CONTROL COIL SYSTEM SO SENSORS ARE MAINTAINED IN THE DESIRED 'EARTH-LOOKING' MODE. ONE FEATURE IS THE PRECISION-POINTING ACCURACY OF THE PRIMARY IMAGER TO 0.01 DEG PROVIDED BY A STAR SENSOR AND UPDATED EPHEMERIS NAVIGATION SYSTEM. THIS ALLOWS AUTOMATIC GEOGRAPHICAL MAPPING OF THE DIGITAL IMAGERY TO THE NEAREST PICTURE ELEMENT. THE OPERATIONAL LINE SCAN SYSTEM (OLS) BUILT BY WESTINGHOUSE, IS THE PRIMARY DATA ACQUISITION SYSTEM THAT PROVIDES REAL-TIME OR STORED, MULTI-ORBIT, DAY-AND-NIGHT VISUAL AND INFRARED IMAGERY AT 1/3 NAUTICAL MILE RESOLUTION FOR ALL MAJOR LAND MASSES, 1-1/2 NAUTICAL MILE RESOLUTION FOR COMPLETE GLOBAL COVERAGE, AND PROVIDES WITH THIS DATA CALIBRATION, TIMING, AND OTHER AUXILIARY SIGNALS TO THE SPACECRAFT FOR DIGITAL TRANSMISSION TO THE GROUND. A SUPPLEMENTARY SENSOR PACKAGE, THE SPECIAL SENSOR H (SSH), A STEP-SCANNING RADIOMETER, IS THE INFRARED TEMPERATURE-HUMIDITY-OZONE SOUNDER. THE DATA PROCESSING SYSTEM, WHICH INCLUDES THREE HIGH-DENSITY TAPE RECORDERS, IS CAPABLE OF STORING A TOTAL OF 400 MIN OF DATA, EACH ALLOWING FULL GLOBAL COVERAGE TWICE DAILY. EITHER RECORDED OR REAL-TIME DATA ARE TRANSMITTED TO GROUND-RECEIVING SITES BY TWO REDUNDANT S-BAND TRANSMITTERS. RECORDED DATA ARE READ OUT TO TRACKING SITES LOCATED AT FAIRCHILD AFB, WA, AND LORING AFB, ME, AND RELAYED BY SATCOM TO AIR FORCE GLOBAL WEATHER CENTRAL, OFFUTT AFB, NE. REAL-TIME DATA ARE READ OUT AT MOBILE TACTICAL SITES LOCATED AROUND THE WORLD. A MORE COMPLETE DESCRIPTION OF THE SATELLITE CAN BE FOUND IN THE REPORT, 'THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, 4, JULY - AUGUST 1975.

----- DMSP-F5, AFGWC STAFF-----

INVESTIGATION NAME- OPERATIONAL LINESCAN SYSTEM (OLS)

NSSDC ID- DMSP-F5-01 INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SYS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION

THE OPERATIONAL LINESCAN SYSTEM (OLS) IS THE PRIMARY EXPERIMENT ON THE DMSP-F5 SPACECRAFT. THE PURPOSE OF THIS EXPERIMENT IS TO PROVIDE GLOBAL, DAY/NIGHT OBSERVATIONS OF CLOUD COVER AND CLOUD TEMPERATURE MEASUREMENTS TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS FOR OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE OLS EMPLOYS A SCANNING OPTICAL TELESCOPE DRIVEN IN AN OSCILLATING MOTION, WITH OPTICAL COMPENSATION FOR IMAGE MOTION, WHICH RESULTS IN NEAR-CONSTANT RESOLUTION THROUGHOUT THE SENSOR FIELD OF VIEW. THE RADIOMETER OPERATES IN TWO ('LIGHT' AND 'THERMAL') SPECTRAL INTERVALS -- (1) VISIBLE AND NEAR INFRARED (0.4 TO 1.1 MICROMETERS) AND (2) INFRARED (8 TO 13 MICROMETERS). THE RADIOMETER PRODUCES, WITH ONBOARD PROCESSING, DATA IN FOUR MODES -- LF (LIGHT FINE) AND TF (THERMAL FINE) DATA WITH A RESOLUTION OF .56 KM AND LS (LIGHT SMOOTHED) AND TS (THERMAL SMOOTHED) DATA WITH A RESOLUTION OF 2.8 KM. EACH OF THREE ONBOARD RECORDERS HAS A STORAGE CAPABILITY OF 400 MIN OF BOTH LS AND TS DATA OR 20 MIN OF LF AND TF DATA. FOR DIRECT READOUT TO TACTICAL SITES, THE EXPERIMENT IS PROGRAMMED SO THAT LF AND TS DATA ARE OBTAINED AT NIGHT. THE INFRARED DATA (TF AND TS) COVERS A TEMPERATURE RANGE OF 210 TO 310 K WITH AN ACCURACY OF 1 DEG C. THE LS DATA MODE PROVIDES VISUAL DATA THROUGH A DYNAMIC RANGE FROM FULL SUNLIGHT DOWN TO A QUARTER MOON. THIS MODE ALSO AUTOMATICALLY ADJUSTS THE GAIN ALONG SCAN TO ALLOW USEFUL DATA TO BE OBTAINED ACROSS THE TERMINATOR. ADDITIONAL INFORMATION OF THIS EXPERIMENT IS CONTAINED IN THE REPORT, 'PRIMARY OPTICAL SUBSYSTEMS FOR DMSP,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, JULY - AUGUST 1975.

----- DMSP-F5, AFGWC STAFF-----

INVESTIGATION NAME- VERTICAL TEMPERATURE PROFILE RADIOMETER
SPECIAL SENSOR H (SSH)

NSSDC ID- DMSP-F5-02 INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SYS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION

SPECIAL SENSOR H (SSH) IS A VERTICAL TEMPERATURE PROFILE RADIOMETER (VTPR). THE OBJECTIVE OF THIS EXPERIMENT IS TO OBTAIN VERTICAL TEMPERATURE, WATER VAPOR, AND OZONE PROFILES OF THE ATMOSPHERE TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE SSH IS A 16-CHANNEL SENSOR WITH ONE CHANNEL (1022 CM-1) IN THE 10-MICROMETER OZONE ABSORPTION BAND, ONE CHANNEL (835 CM-1) IN THE 12-MICROMETER ATMOSPHERIC WINDOW, SIX CHANNELS (747, 725, 708, 695, 676, 668.5 CM-1) IN THE 15-MICROMETER CO2 ABSORPTION BAND, AND EIGHT CHANNELS (535, 408.5, 441.5, 420, 374, 397.5, 355, 353.5 CM-1) IN THE 22- TO 30-MICROMETER ROTATIONAL WATER VAPOR ABSORPTION BAND. THE EXPERIMENT CONSISTS OF AN OPTICAL

SYSTEM, DETECTOR AND ASSOCIATED ELECTRONICS, AND A SCANNING MIRROR. THE SCANNING MIRROR IS STEPPED ACROSS THE SATELLITE SUBTRACK, ALLOWING THE SSH TO VIEW 25 SEPARATE COLUMNS OF THE ATMOSPHERE EVERY 32 S OVER A CROSS TRACK GROUND SWATH OF 2000 KM. WHILE THE SCANNING MIRROR IS STOPPED AT A SCENE STATION, THE CHANNEL FILTERS ARE SEQUENCED THROUGH THE FIELD OF VIEW. THE SURFACE RESOLUTION IS APPROXIMATELY 39 KM AT NADIR. THE RADIANCE DATA ARE TRANSFORMED INTO TEMPERATURE WATER VAPOR AND OZONE PROFILES BY A MATHEMATICAL INVERSION TECHNIQUE. A MORE COMPLETE DESCRIPTION OF THE EXPERIMENT CAN BE FOUND IN THE REPORT, 'DMSP SPECIAL METEOROLOGICAL SENSOR H, OPTICAL SUBSYSTEM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, 284-288, JULY-AUGUST 1975.

----- DMSP-F5, ROTHWELL-----

INVESTIGATION NAME- PRECIPITATING ELECTRON SPECTROMETER

NSSDC ID- DMSP-F5-03 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
AERONOMY

PERSONNEL
PI - P.L. ROTHWELL USAF GEOPHYS LAB

BRIEF DESCRIPTION

THE SPECTROMETER CONSISTS OF TWO DIFFERENT-SIZED CYLINDRICAL ELECTROSTATIC ANALYZERS (ESA) USING CHANNELTRON ELECTRON MULTIPLIERS. THE ESA'S POINT TOWARD THE ZENITH IN ORDER TO MEASURE PRECIPITATING ELECTRONS. THE LARGE ESA HAS A FIELD OF VIEW (FOV) OF 1.6 BY 8.0 DEG WITH A DELTA E/E OF 0.04, WHILE THE SMALL ONE HAS A FOV OF 3.7 BY 4.8 DEG WITH A DELTA E/E OF 0.072. THE LARGE ESA COVERS THE RANGE FROM 1 TO 20 KEV AND THE OTHER ONE FROM 50 TO 1000 EV. A COMPLETE EIGHT-POINT SPECTRUM FROM EACH UNIT IS OBTAINED IN 1 S.

----- DMSP-F5, SAGALYN-----

INVESTIGATION NAME- IONOSPHERIC PLASMA MONITOR

NSSDC ID- DMSP-F5-05 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
AERONOMY
PARTICLES AND FIELDS

PERSONNEL
PI - R.C. SAGALYN USAF GEOPHYS LAB

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTS OF ONE SPHERICAL (SEA) AND ONE PLANAR (PEA) ELECTROSTATIC ANALYZER. THE SEA PROVIDES MEASUREMENTS OF ELECTRON DENSITIES FROM 10 TO 1.E6/CUBIC CM IN THE TEMPERATURE RANGE FROM 200 TO 15,000 K. THE PEA MEASURES ION TEMPERATURES IN THE SAME RANGE AS WELL AS THE AVERAGE ION MASS OVER THE RANGE 1 TO 35 U. THE PEA IS ORIENTED IN THE DIRECTION OF THE POSITIVE SPACECRAFT VELOCITY VECTOR, WHILE THE SEA IS ORIENTED AT RIGHT ANGLES TO THIS DIRECTION AND AWAY FROM THE SUN TO MINIMIZE THE EFFECT OF PHOTOELECTRONS. THE DEVICE ALSO PROVIDES A MEASUREMENT OF THE SPACECRAFT POTENTIAL.

----- DMSP-F5, SNYDER-----

INVESTIGATION NAME- PASSIVE IONOSPHERIC MONITOR

NSSDC ID- DMSP-F5-04 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
IONOSPHERES

PERSONNEL
PI - A.L. SNYDER USAF GEOPHYS LAB

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTS OF A HIGH-FREQUENCY RADIO RECEIVER CONNECTED TO A SHORT ANTENNA THAT SWEEPS FROM 1.3 TO 13.9 MHZ IN 100-KHZ STEPS. THE DEVICE IS USED TO MONITOR THE IONOSPHERIC BREAKTHROUGH FREQUENCY OF NOISE GENERATED BY MAN-MADE OR NATURAL SOURCES BELOW THE F2 LAYER TO OBTAIN THE CRITICAL FREQUENCY OF THIS LAYER (F0F2). THE F0F2 PARAMETER IS USED IN CONSTRUCTING ELECTRON-DENSITY PROFILES USED IN FORECASTING THE STATE OF THE IONOSPHERE. THE INSTRUMENT CAN DETECT ELECTRIC FIELDS DOWN TO 10 MICROVOLTS/M.

***** DYNAMICS EXPLORER-A*****

SPACECRAFT COMMON NAME- DYNAMICS EXPLORER-A
ALTERNATE NAMES-

NSSDC ID- DE-A

LAUNCH DATE- 08/01/81 WEIGHT- 283. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 417. MIN
PERIAPSIS- 675. KM ALT

INCLINATION- 90.0 DEG
APOAPSIS- 23918. KM ALT

PERSONNEL

MG - F.W. GAETANO
SC - D.P. CAUFFMAN
PM - G.D. HOGAN
PS - R.A. HOFFMAN

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE GENERAL OBJECTIVE OF THE DYNAMICS EXPLORER (DE) MISSION IS TO INVESTIGATE THE STRONG INTERACTIVE PROCESSES COUPLING THE HOT, TENUOUS, CONVECTING PLASMAS OF THE MAGNETOSPHERE AND THE COOLER, DENSER PLASMAS AND GASES COROTATING IN THE EARTH'S IONOSPHERE, UPPER ATMOSPHERE, AND PLASMASPHERE. TWO SATELLITES, LAUNCHED TOGETHER, DE-A AND -B, ARE PLACED IN POLAR COPLANAR ORBITS TO PERMIT SIMULTANEOUS MEASUREMENTS AT HIGH AND LOW ALTITUDES ON THE SAME FIELD LINES. THE DE-A SPACECRAFT (HIGH ALTITUDE MISSION) USES AN ELLIPTICAL ORBIT SELECTED TO ALLOW: (1) MEASUREMENTS EXTENDING FROM THE HOT MAGNETOSPHERIC PLASMA THROUGH THE PLASMASPHERE TO THE COOL IONOSPHERE; (2) GLOBAL AURORAL IMAGING, WAVE MEASUREMENTS IN THE HEART OF THE MAGNETOSPHERE, AND CROSSING OF AURORAL FIELD LINES AT SEVERAL EARTH RADII, AND (3) MEASUREMENTS FOR SIGNIFICANT PERIODS ALONG A MAGNETIC FIELD FLUX TUBE. THE SPACECRAFT APPROXIMATES A SHORT RIGHT CYLINDER 137 CM IN DIAMETER AND 115 CM HIGH. THE ANTENNAS IN THE X-Y PLANE ARE 215-M TIP-TO-TIP, AND ON THE Z-AXIS ARE 15-M TIP-TO-TIP. TWO 3-M BOOMS ARE PROVIDED FOR REMOTE MEASUREMENTS. THE TOTAL MASS OF THE INSTRUMENTS IS 55 KG. POWER IS SUPPLIED BY A SOLAR CELL ARRAY. THE SPACECRAFT IS SPIN STABILIZED, WITH A SPIN RATE OF 10 RPM, WITHIN ONE PERCENT. THE SPIN AXIS IS WITHIN ONE PERCENT OF THE NORMAL TO THE ORBIT PLANE. A PULSE CODE MODULATION (PCM) TELEMETRY DATA SYSTEM IS USED THAT OPERATES IN REAL TIME OR A TAPE RECORDER MODE. DATA ARE ACQUIRED ON A SCIENCE PROBLEM ORIENTED BASIS, WITH CLOSELY COORDINATED OPERATIONS OF THE VARIOUS INSTRUMENTS, BOTH SATELLITES, AND SUPPORTIVE EXPERIMENTS.

----- DYNAMICS EXPLORER-A, BURCH-----

INVESTIGATION NAME- HIGH ALTITUDE PLASMA INSTRUMENT

NSSDC ID- DE-A -05

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - J.L. BURCH
OI - R.A. HOFFMAN
OI - J.D. WINNINGHAM
OI - D.M. KLUMPAR

U OF TEXAS, SAN ANTONIO
NASA-GSFC
U OF TEXAS, DALLAS
U OF TEXAS, DALLAS

BRIEF DESCRIPTION

THE HIGH-ALTITUDE PLASMA INSTRUMENT (HAPI) CONSISTS OF AN ARRAY OF ELECTROSTATIC ANALYZERS CAPABLE OF MAKING MEASUREMENTS OF THE PHASE-SPACE DISTRIBUTIONS OF ELECTRONS AND POSITIVE IONS FROM 5 EV TO 25 KEV AS A FUNCTION OF PITCH ANGLE. THIS INVESTIGATION PROVIDES DATA CONTRIBUTING TO THE STUDIES OF: (1) THE COMPOSITION AND ENERGY OF BIRKELAND CURRENT CHARGE CARRIERS, (2) THE DYNAMIC CONFIGURATION OF HIGH-LATITUDE MAGNETIC FLUX TUBES, (3) AURORAL PARTICLE SOURCE REGIONS AND ACCELERATION MECHANISMS, (4) THE ROLE OF E PARALLEL TO B, AND E PERPENDICULAR TO B IN THE MAGNETOSPHERE-IONOSPHERE SYSTEM, (5) THE SOURCES AND THE EFFECT OF POLAR CAP PARTICLE FLUXES, (6) THE TRANSPORT OF PLASMA WITHIN AND THROUGH THE MAGNETOSPHERIC CLEFTS, (7) WAVE-PARTICLE INTERACTIONS, AND (8) HOT-COLD PLASMA INTERACTIONS. THIS INSTRUMENT CONSISTS OF FIVE IDENTICAL DETECTOR HEADS, EACH HAVING AN ELECTROSTATIC ANALYZER (OF THE ISIS-2 TYPE) AND TWO SENSORS (ONE ELECTRON CHANNEL AND ONE ION CHANNEL). THE DETECTOR HEADS ARE MOUNTED ON THE MAIN BODY. ONE OF THE DETECTOR HEADS IS MOUNTED IN THE RADIAL DIRECTION, AND THE OTHERS AT PLUS OR MINUS 6 DEG AND PLUS OR MINUS 12 DEG FROM THIS DETECTOR IN A PLANE DEFINED BY THE SPIN AXIS AND RADIAL DETECTOR. ONE DETECTOR SWEEPS WITHIN A FEW DEG OF THE FIELD LINE DURING EACH ROTATION OF THE SPACECRAFT, EXCEPT WHEN THE MAGNETIC FIELD IS GREATLY DEFORMED FROM ITS MERIDIAN PLANE. THE BASIC MODE OF OPERATION PROVIDES A 32-POINT ENERGY SPECTRUM FROM EACH SENSOR, BUT THE VOLTAGES ON THE ELECTROSTATIC ANALYZERS ARE PROGRAMMABLE TO ALLOW FOR OPERATION OVER LIMITED PORTIONS OF THE ENERGY SPECTRUM, OR AT HIGHER TIME RESOLUTION WITH REDUCED ENERGY RESOLUTION.

----- DYNAMICS EXPLORER-A, CHAPPELL-----

INVESTIGATION NAME- RETARDING ION MASS SPECTROMETER

NSSDC ID- DE-A -04

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - C.R. CHAPPELL
OI - P.M. BANKS
OI - W.B. HANSON
OI - J.H. HOFFMAN
OI - A.F. NAGY
OI - G.R. CARIGNAN

NASA-MSFC
UTAH STATE U
U OF TEXAS, DALLAS
U OF TEXAS, DALLAS
U OF MICHIGAN
U OF MICHIGAN

BRIEF DESCRIPTION

THE RETARDING ION MASS SPECTROMETER (RIMS) CONSISTS OF A RETARDING POTENTIAL ANALYZER FOR ENERGY ANALYSIS IN SERIES WITH A MAGNETIC ION MASS SPECTROMETER FOR MASS ANALYSIS. THIS INSTRUMENT IS DESIGNED TO OPERATE IN TWO BASIC COMMANDABLE MODES: A HIGH-ALTITUDE MODE IN WHICH THE DENSITY, TEMPERATURE, AND BULK FLOW CHARACTERISTICS OF H⁺, HE⁺, AND O⁺ IONS ARE MEASURED, AND A LOW-ALTITUDE MODE THAT CONCENTRATES ON THE COMPOSITION IN THE 1- TO 64-U RANGE. THIS INVESTIGATION PROVIDES INFORMATION ON: (1) THE DENSITIES OF H⁺, HE⁺, AND O⁺ IONS IN THE IONOSPHERE, PLASMASPHERE, PLASMA TROUGH, AND POLAR CAP (INCLUDING THE DENSITY DISTRIBUTION ALONG THE MAGNETIC VECTOR IN THE VICINITY OF THE SATELLITE APOGEE); (2) THE TEMPERATURE OF H⁺, HE⁺, AND O⁺ IONS IN THE IONOSPHERE, PLASMASPHERE, PLASMA TROUGH, AND POLAR CAP (ENERGY RANGE 0-45 EV); (3) THE BULK FLOW VELOCITIES OF H⁺, HE⁺, AND O⁺ IN THE PLASMAPAUSE, PLASMA TROUGH AND POLAR CAP; (4) THE CHANGING CHARACTER OF THE COLD PLASMA DENSITY, TEMPERATURE, AND BULK FLOW IN REGIONS OF INTERACTION WITH HOT PLASMA SUCH AS AT THE BOUNDARY BETWEEN THE PLASMASPHERE AND THE RING CURRENT; AND (5) THE DETAILED COMPOSITION OF IONOSPHERIC PLASMA IN THE 1- TO 64-U RANGE. THE INSTRUMENT CONSISTS OF A DETECTOR HEAD MOUNTED PERPENDICULAR TO THE SPIN AXIS SO THAT THE DETECTOR SWEEPS OUT AN ARC NEARLY IN THE MAGNETIC MERIDIAN PLANE. THE DETECTOR HEAD HAS A GRIDDED WEAKLY COLLIMATING APERTURE WHERE THE RETARDING ANALYSIS IS PERFORMED, FOLLOWED BY A PARALLEL PLATE CERAMIC MAGNETIC MASS ANALYZER WITH THREE SEPARATE EXIT SLITS CORRESPONDING TO ION MASSES IN THE RATIO 1:4:16. IONS EXITING FROM THESE SLITS ARE DETECTED WITH ELECTRON MULTIPLIERS. IN THE APOGEE MODE THE THERMAL PARTICLE FLUXES ARE MEASURED AS THE POTENTIAL ON A SET OF RETARDING GRIDS THAT ARE STEPPED THROUGH A SEQUENCE OF SETTINGS. IN THE PERIGEE MODE, THE RETARDING GRIDS ARE GROUNDED AND THE DETECTOR UTILIZES A CONTINUOUS ACCELERATION POTENTIAL SWEEP THAT FOCUSES THE MASS RANGES FROM 1 TO 2, 4 TO 10, AND 14 TO 34 U ON THE LOW-, MID-, AND HIGH-MASS SENSORS, RESPECTIVELY.

----- DYNAMICS EXPLORER-A, CORONITI-----

INVESTIGATION NAME- AURORAL PHYSICS

NSSDC ID- DE-A -07

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
UPPER ATMOSPHERE RESEARCH

PERSONNEL

PI - F.V. CORONITI
OI - C.F. KENNEL
OI - J.E. MAGGS

U OF CALIF, LA
U OF CALIF, LA
U OF CALIF, LA

BRIEF DESCRIPTION

THE PRIMARY GOAL OF THIS INVESTIGATION IS TO USE THE RESULTS FROM OTHER EXPERIMENTS, PARTICULARLY DE-A-03 (FRANK) TO TEST PREVIOUS THEORETICAL MODELS AND TO DEVELOP NEW ONES, WITH EMPHASIS ON RESEARCH AREAS RELATED TO AURORAL ARCS, FIELD-ALIGNED CURRENTS, PLASMA WAVE TURBULENCE ASSOCIATED WITH ANOMALOUS RESISTANCE, GENERATION OF AURORAL ELECTRON BEAMS, PRODUCTION OF KILOMETRIC AND VLF HISS RADIATION, AND SPREAD-F. IN ADDITION, CORRELATION STUDIES ARE ORGANIZED BY SELECTING EVENTS THAT ARE INTERESTING TO THE VARIOUS INVESTIGATORS AND DATA REDUCTION PROCEDURES ARE SUGGESTED TO FACILITATE COMPARISON AND INTERPRETATION OF THE DATA.

----- DYNAMICS EXPLORER-A, FRANK-----

INVESTIGATION NAME- GLOBAL AURORAL IMAGING AT VISIBLE AND ULTRAVIOLET WAVELENGTHS

NSSDC ID- DE-A -03

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
UPPER ATMOSPHERE RESEARCH
IONOSPHERES

PERSONNEL

PI - L.A. FRANK
OI - K.L. ACKERSON
OI - R.L. CAROVILLANO
OI - R.H. EATHER

U OF IOWA
U OF IOWA
BOSTON COLLEGE
BOSTON COLLEGE

BRIEF DESCRIPTION

THE SPIN-SCAN AURORAL IMAGER (SAI) PROVIDES GLOBAL AURORAL IMAGING AT VISIBLE AND ULTRAVIOLET WAVELENGTHS. IT ACQUIRES: (1) IMAGES AT SEVERAL VISIBLE WAVELENGTHS; (2) IMAGES WITHIN A VACUUM ULTRAVIOLET 'WINDOW', WHICH ALLOWS USABLE IMAGING OF THE AURORA IN THE SUNLIT IONOSPHERE; AND (3) PHOTOMETRIC MEASUREMENTS OF THE HYDROGEN CORONA. THIS INVESTIGATION PROVIDES DATA THAT SIGNIFICANTLY ADVANCE THE KNOWLEDGE OF (1) THE SPATIAL AND TEMPORAL CHARACTER OF THE ENTIRE AURORAL OVAL AT BOTH VISIBLE AND VACUUM ULTRAVIOLET WAVELENGTHS (WITH GOOD TIME RESOLUTION); (2) THE ASSOCIATION OF AURORAL AND MAGNETOSPHERIC PLASMAS WITH THE DIVERSE AURORAL

EMISSION FEATURES; (3) THE RELATIONSHIP OF THE AURORAL EMISSIONS WITH FIELD-ALIGNED CURRENTS; (4) THE ENERGY DEPOSITED IN THE AURORAL IONOSPHERE BY CHARGED PARTICLES; (5) THE ACCELERATION MECHANISM RESPONSIBLE FOR 'INVERTED-V' PRECIPITATION EVENTS; (6) THE ROLE OF THE POLAR CAP AND MAGNETOTAIL IN AURORAL AND MAGNETOSPHERIC DYNAMICS, AND (7) THE TIME-DEPENDENT DISTRIBUTION OF NEUTRAL HYDROGEN IN THE RING CURRENT AND POLAR REGIONS. FOR VISIBLE WAVELENGTHS, THE PHOTOMETERS HAVE A WIDE-ANGLE COLLIMATOR; A SUPER-REFLECTING SCANNING MIRROR; A MIRROR DRIVE MOTOR; A QUARTZ FIELD LENS; AN IMAGE-VIEWING ASSEMBLY OF FIELD-STOP, PINHOLE AND COLLIMATING LENS; A FILTER WHEEL WITH NARROW-BAND INTERFERENCE FILTERS WITH HALF-POWER BANDWIDTHS OF 8 Å CENTERED AT 5577 Å, 6300 Å, AND 3914 Å; AND A SMALL PHOTOMULTIPLIER TUBE WITH AN EXTENDED RED PHOTOCATHODE. THE VACUUM ULTRAVIOLET IMAGING PHOTOMETER IS A SPIN-SCAN NEWTONIAN TELESCOPE. THE FIRST OPTICAL ELEMENT IS AN ALUMINUM SCANNING MIRROR WITH A MGf2 OVERCOAT. THE COLLIMATION AND MIRROR DRIVE ARE SIMILAR TO THAT DESCRIBED PREVIOUSLY FOR THE VISIBLE IMAGING PHOTOMETER. A FILTER WHEEL WITH MGf2, CAF2, AND BAF2 FILTERS ALLOWS GLOBAL IMAGING FROM 1370 Å TO 1700 Å, AT 1304 Å, 1356 Å, AND 1216 Å. THE DETECTOR IS A PHOTOMULTIPLIER TUBE WITH A CSI PHOTOCATHODE AND A MGf2 WINDOW.

----- DYNAMICS EXPLORER-A, HELLIWELL-----

INVESTIGATION NAME- CONTROLLED AND NATURALLY-OCCURRING WAVE PARTICLE INTERACTIONS

NSSDC ID- DE-A -08 INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
RADIO PHYSICS

PERSONNEL
PI - R.A. HELLIWELL STANFORD U
OI - T.F. BELL STANFORD U
OI - D.L. CARPENTER STANFORD U
OI - C.G. PARK STANFORD U
OI - J.B. REAGAN LOCKHEED PALO ALTO

BRIEF DESCRIPTION
THIS INVESTIGATION USES A GROUND-BASED VERY-LOW-FREQUENCY/LOW-FREQUENCY (VLF/LF) (0.5-200 KHZ) TRANSMITTER LOCATED AT SIPLE, ANTARCTICA, AT AN L VALUE OF ABOUT 4, AND THE BROAD-BAND MAGNETIC FIELD DETECTOR FROM EXPERIMENT DE-A-02. THE PRIMARY OBJECTIVE OF THE INVESTIGATION IS TO DETERMINE THE RELATIONSHIP BETWEEN VLF/LF WAVES AND ENERGETIC ELECTRONS IN THE MAGNETOSPHERE WITH EMPHASIS ON WAVE GROWTH, STIMULATED EMISSIONS, AND WAVE-INDUCED PERTURBATIONS OF THE ENERGETIC ELECTRONS. OTHER OBJECTIVES ARE TO: (1) DETERMINE HOW WAVE PROPAGATION FROM BOTH GROUND AND MAGNETOSPHERIC SOURCES IS AFFECTED BY FIELD-ALIGNED PLASMA STRUCTURES SUCH AS THE PLASMAPAUSE AND DUCTS OF ENHANCED IONIZATION, (2) USE THE WAVE DATA TO DESCRIBE THE STRUCTURE OF THE PLASMAPAUSE AND THE DISTRIBUTION OF IONIZATION ALONG FIELD-ALIGNED DUCTS, AND (3) STUDY THE EFFECTS OF EARTH POWER-LINE RADIATION AND OTHER VLF WAVE ACTIVITY. THE BROAD-BAND MAGNETIC FIELD DATA ARE OBTAINED FROM THE LOOP ANTENNA, SELECTABLE IN THREE BANDS; 2 TO 4, 4 TO 8, AND 8 TO 16 KHZ.

----- DYNAMICS EXPLORER-A, SHAWHAN-----

INVESTIGATION NAME- PLASMA WAVES

NSSDC ID- DE-A -02 INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL
PI - S.D. SHAWHAN U OF IOWA
OI - D.A. GURNETT U OF IOWA

BRIEF DESCRIPTION
THE PLASMA WAVE INSTRUMENT (PWI) MEASURES ELECTRIC FIELDS FROM 2 HZ TO 2 MHZ, MAGNETIC FIELDS FROM 100 HZ TO 400 KHZ, AND THE DC POTENTIAL DIFFERENCE BETWEEN THE ELECTRIC DIPOLE ELEMENTS. THE OBJECTIVES OF THIS INVESTIGATION ARE TO MEASURE THE SPATIAL, TEMPORAL, SPECTRAL, AND WAVE CHARACTERISTICS (PARTICULARLY THE POYNTING VECTOR COMPONENT ALONG THE MAGNETIC FIELD LINE) AND THE WAVE POLARIZATION FOR EXTREMELY-LOW-FREQUENCY (ELF), VERY-LOW-FREQUENCY (VLF), AND HIGH-FREQUENCY (HF) NOISE PHENOMENA. OF SPECIAL INTEREST ARE THE AURORAL KILOMETRIC RADIATION AND VLF HISS, AND A VARIETY OF ELECTROSTATIC WAVES THAT MAY CAUSE FIELD-ALIGNED ACCELERATION OF PARTICLES. THE INVESTIGATION MAKES USE OF THE LONG DIPOLE ANTENNAS AND A MAGNETIC LOOP ANTENNA. A SINGLE-AXIS SEARCH COIL MAGNETOMETER AND A SHORT ELECTRIC ANTENNA ARE INCLUDED FOR LOW-FREQUENCY MEASUREMENTS AND ELECTROSTATIC NOISE AT SHORT WAVELENGTHS. THE ELECTRONICS CONSISTS OF: (1) A WIDEBAND/LONG BASELINE RECEIVER WITH A BANDWIDTH OF 10 OR 40 KHZ FROM 0-2 MHZ; (2) A SWEEP-FREQUENCY CORRELATOR, CONTAINING TWO SWEEP-FREQUENCY RECEIVERS AND PHASE DETECTORS, SWEEPING 100 HZ TO 400 KHZ IN 32 SECONDS, GIVES THE PHASE BETWEEN MAGNETIC AND ELECTRIC COMPONENTS OF THE FIELD; (3) A LOW-FREQUENCY CORRELATOR CONTAINING TWO FILTER RECEIVERS AND PHASE DETECTORS. EIGHT FILTERS IN THE RANGE 1.78-100 HZ ARE SWEEP IN 8 S; (4) DC MONITORS TO MEASURE THE VOLTAGE DIFFERENCE BETWEEN THE TWO SETS

OF LONG DIPOLE ANTENNAS; (5) A LINEAR WIDEBAND RECEIVER, SELECTABLE FROM 2- TO 4-, 4- TO 8-, OR 8- TO 16-KHZ BANDS.

----- DYNAMICS EXPLORER-A, SHELLEY-----

INVESTIGATION NAME- HOT PLASMA COMPOSITION

NSSDC ID- DE-A -06 INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - E.G. SHELLEY LOCKHEED PALO ALTO
OI - R.G. JOHNSON LOCKHEED PALO ALTO
OI - R.D. SHARP LOCKHEED PALO ALTO
OI - J. GEISS U OF BERNE
OI - P.X. EBERHARDT U OF BERNE
OI - H. BALSIGER U OF BERNE
OI - D.T. YOUNG U OF BERNE
OI - A. GHIEMMETTI U OF BERNE
OI - B.A. WHALEN NATL RES COUNC OF CAN

BRIEF DESCRIPTION

THE ENERGETIC ION COMPOSITION SPECTROMETER (EICS) HAS HIGH SENSITIVITY AND HIGH RESOLUTION, AND COVERS THE ENERGY RANGE FROM 0 TO 17 KEV PER UNIT CHARGE AND THE MASS RANGE FROM 1 TO 138 U. THIS INVESTIGATION PROVIDES DATA USED IN INVESTIGATING THE STRONG COUPLING MECHANISM BETWEEN THE MAGNETOSPHERE AND THE IONOSPHERE THAT RESULTS IN LARGE FLUXES OF ENERGETIC O+ IONS BEING ACCELERATED FROM THE IONOSPHERE AND INJECTED INTO THE MAGNETOSPHERE DURING MAGNETIC STORMS. THE PROPERTIES OF THE MINOR IONIC SPECIES SUCH AS HE+ AND HE++ RELATIVE TO THE MAJOR CONSTITUENTS OF THE ENERGETIC MAGNETOSPHERE PLASMA ARE ALSO STUDIED IN ORDER TO EVALUATE THE RELATIVE IMPORTANCE OF THE DIFFERENT SOURCES OF THE PLASMA AND OF VARIOUS ENERGIZATION, TRANSPORT, AND LOSS PROCESSES THAT MAY BE MASS- OR CHARGE-DEPENDENT. THE INSTRUMENT IS SIMILAR TO ONE FLOWN ON THE ISEE 1 SATELLITE. IT CONSISTS OF A CURVED-PLATE ELECTROSTATIC ENERGY ANALYZER FOLLOWED BY A COMBINED CYLINDRICAL ELECTROSTATIC-MAGNETIC MASS ANALYZER WITH ELECTRON MULTIPLIERS USED AS DETECTORS. THE ENERGY ANALYZER CAN BE OPERATED IN TWO BASIC ENERGY RANGES, LOW AND HIGH. IN THE HIGH-ENERGY RANGE, THE PLATE POTENTIALS ARE PROGRAMMABLE IN 32 STEPS SUCH THAT THE ENERGY-PER-UNIT CHARGE IS MEASURED IN THE RANGE BETWEEN 0.10 AND 17 KEV WITH NEARLY EQUAL LOGARITHMIC STEPS. AT THE LOWEST STEP, THE ANALYZER BECOMES TRANSPARENT TO ALL IONS WITH ENERGY LESS THAN ABOUT 150 EV. IN THIS LOW-ENERGY RANGE, THE ANALYZER IS HELD ON THIS STEP AND INTEGRAL ENERGY ANALYSIS BETWEEN ZERO AND 150 EV IS PERFORMED WITH A RETARDING POTENTIAL ANALYZER THAT PRECEDES THE PREACCELERATION SECTION. THE MASS ANALYZER CONSISTS OF A CYLINDRICAL-PLATE ELECTROSTATIC ANALYZER BETWEEN THE POLES OF A PERMANENT MAGNET. OPEN MULTIPLIERS ARE USED WITH PULSE-AMPLITUDE DISCRIMINATION AS THE MASS ANALYZER DETECTORS IN ORDER TO IMPROVE THE MASS SEPARATION CHARACTERISTICS OF THE SPECTROMETER.

----- DYNAMICS EXPLORER-A, SUGIURA-----

INVESTIGATION NAME- MAGNETIC FIELD OBSERVATIONS

NSSDC ID- DE-A -01 INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - M. SUGIURA NASA-GSFC
OI - B.G. LEDLEY NASA-GSFC
OI - W.H. FARTHING NASA-GSFC
OI - L.J. CAHILL, JR. U OF MINNESOTA

BRIEF DESCRIPTION

THIS INVESTIGATION USES A TRIAXIAL FLUXGATE MAGNETOMETER (MAG-A), SIMILAR TO ONE ON BOARD DE-B, TO OBTAIN VECTOR MAGNETIC FIELD DATA NEEDED TO STUDY THE MAGNETOSPHERE-IONOSPHERE-ATMOSPHERE COUPLING. THE PRIMARY OBJECTIVE OF THIS INVESTIGATION IS TO OBTAIN MEASUREMENTS OF FIELD-ALIGNED CURRENTS IN THE AURORAL OVAL AND OVER THE POLAR CAP AT TWO DIFFERENT ALTITUDES. THIS IS ACCOMPLISHED USING THE TWO SPACECRAFT AND CORRELATIONS OF THESE MEASUREMENTS WITH OBSERVATIONS OF ELECTRIC FIELDS, PLASMA WAVES, SUPRATHERMAL PARTICLES, THERMAL PARTICLES, AND WITH AURORAL IMAGES OBTAINED FROM INVESTIGATION DE-A-03. THE MAGNETOMETER INCORPORATES ITS OWN 12-BIT A-D CONVERTER, A 4-BIT DIGITAL COMPENSATION REGISTER FOR EACH AXIS, AND A SYSTEM CONTROL TO GENERATE A 48-BIT DATA WORD CONSISTING OF A 16-BIT REPRESENTATION OF THE FIELD MEASURED ALONG EACH OF THE THREE MAGNETOMETER AXES. TRACK AND HOLD MODULES ARE USED TO OBTAIN SIMULTANEOUS SAMPLES ON ALL THREE AXES. INSTRUMENT BANDWIDTH IS 25 HZ. MAXIMUM POSSIBLE ERRORS FROM INSTRUMENTAL SOURCES ARE CONSERVATIVELY ESTIMATED WITHIN 0.005 PERCENT OF READING AND PLUS OR MINUS 5 NT IN HIGH-FIELD REGIONS. THE MAGNETOMETER'S DIGITAL COMPENSATION OF THE AMBIENT FIELD IS IN PRECISE 8000 NT (8000 GAMMAS) INCREMENTS.

***** DYNAMICS EXPLORER-B*****

SPACECRAFT COMMON NAME- DYNAMICS EXPLORER-B
ALTERNATE NAMES-

NSSDC ID- DE-B

LAUNCH DATE- 08/01/81 WEIGHT- 310. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 100. MIN INCLINATION- 90.0 DEG
PERIAPSIS- 290. KM ALT APOAPSIS- 1300. KM ALT

PERSONNEL
MG - F.W. GAETANO NASA HEADQUARTERS
SC - D.P. CAUFFMAN NASA HEADQUARTERS
PM - G.D. HOGAN NASA-GSFC
PS - R.A. HOFFMAN NASA-GSFC

BRIEF DESCRIPTION
THE DE-B SPACECRAFT (LOW-ALTITUDE MISSION) COMPLEMENTS THE HIGH-ALTITUDE MISSION (DE-A) AND IS PLACED INTO AN ORBIT WITH A PERIGEE SUFFICIENTLY LOW TO PERMIT MEASUREMENTS OF NEUTRAL COMPOSITION, TEMPERATURE, AND WIND. THE APOGEE IS HIGH ENOUGH TO PROVIDE DE-B WITH A LIFETIME OF GREATER THAN 18 MONTHS AND PERMITS MEASUREMENTS ABOVE THE INTERACTION REGIONS OF SUPRATHERMAL IONS AND PLASMA FLOW MEASUREMENTS AT THE FEET OF THE MAGNETOSPHERIC FIELD LINES. THE SPACECRAFT APPROXIMATES A SHORT RIGHT CYLINDER 137 CM IN DIAMETER AND 115 CM HIGH. THE TRIAXIAL ANTENNAS ARE 23 M TIP-TO-TIP. ONE 3-M BOOM IS PROVIDED FOR REMOTE MEASUREMENTS. THE INSTRUMENT PACKAGE HAS A MASS OF 75 KG. POWER IS SUPPLIED BY A SOLAR CELL ARRAY. THE SPACECRAFT IS THREE-AXIS STABILIZED WITH THE YAW AXIS ALIGNED TOWARD THE CENTER OF THE EARTH TO WITHIN 1 DEG. THE SPIN AXIS IS NORMAL TO THE ORBIT PLANE WITHIN 1 DEG WITH A SPIN RATE OF ONE REVOLUTION PER ORBIT. A SINGLE-AXIS SCAN PLATFORM WAS INCLUDED IN ORDER TO MOUNT THE LOW-ALTITUDE PLASMA INSTRUMENT (DE-B-08). THE PLATFORM ROTATES ABOUT THE Z SPIN AXIS. A PCM TELEMETRY DATA SYSTEM IS USED THAT OPERATES IN REAL TIME OR IN A TAPE RECORDER MODE. DATA ARE ACQUIRED ON A SCIENCE PROBLEM ORIENTED BASIS, WITH CLOSELY COORDINATED OPERATIONS OF THE VARIOUS INSTRUMENTS, BOTH SATELLITES, AND SUPPORTIVE EXPERIMENTS.

----- DYNAMICS EXPLORER-B, BRACE-----

INVESTIGATION NAME- LANGMUIR PROBE

NSSDC ID- DE-B -09 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - L.H. BRACE NASA-GSFC
OI - W.R. HOEGY NASA-GSFC
OI - R.F. THEIS NASA-GSFC
OI - K.D. COLE LA TROBE U
OI - G.R. CARIGNAN U OF MICHIGAN

BRIEF DESCRIPTION
THE LANGMUIR PROBE INSTRUMENT (LANG) IS A CYLINDRICAL ELECTROSTATIC PROBE THAT OBTAINS MEASUREMENTS OF ELECTRON TEMPERATURE, TE, AND ELECTRON OR ION CONCENTRATION, NE OR NI, RESPECTIVELY. DATA FROM THIS INVESTIGATION ARE USED TO PROVIDE TEMPERATURE AND DENSITY MEASUREMENTS ALONG MAGNETIC FIELD LINES RELATED TO THERMAL ENERGY AND PARTICLE FLOWS WITHIN THE MAGNETOSPHERE-IONOSPHERE SYSTEM, TO PROVIDE THERMAL PLASMA CONDITIONS FOR WAVE-PARTICLE INTERACTIONS, AND TO MEASURE LARGE-SCALE AND FINE-STRUCTURE IONOSPHERIC EFFECTS OF ENERGY DEPOSITION IN THE IONOSPHERE. THE LANGMUIR PROBE INSTRUMENT IS IDENTICAL TO THAT USED ON THE AE SATELLITES AND THE PIONEER VENUS ORBITER. THE INSTRUMENT EMPLOYS TWO INDEPENDENTLY OPERATED CYLINDRICAL COLLECTORS, EACH MOUNTED AT THE END OF A SHORT BOOM. EACH COLLECTOR IS 5 CM LONG AND 0.3 CM IN DIAMETER. AN ELECTRONIC UNIT APPLIES APPROPRIATE VOLTAGE WAVEFORMS TO EACH PROBE AND MEASURES THE RESULTING CURRENTS THAT ARE DRAWN FROM THE IONOSPHERIC PLASMA SURROUNDING THE SPACECRAFT. THESE CURRENTS ARE INTRODUCED TO CIRCUITS THAT ARE ABLE TO PERFORM AN IN-FLIGHT ANALYSIS OF THE DATA FOR TE, NE, AND NI. THIS GREATLY REDUCES THE REQUIREMENT FOR HIGH TELEMETRY DATA RATES AND PERMITS INCREASED SPATIAL RESOLUTION OF THE MEASUREMENTS. SPACECRAFT POTENTIAL CAN ALSO BE DETERMINED FROM THESE MEASUREMENTS. THE INSTRUMENT HAS SELECTABLE MODES OF OPERATION THAT PROVIDE VARIOUS DEGREES OF SPATIAL RESOLUTION. MAXIMUM RESOLUTION FOR NE OR NI IS OBTAINED BY FIXING THE POTENTIAL OF ONE PROBE AND CONTINUOUSLY SAMPLING THE RESULTING RESPECTIVE ELECTRON OR ION CURRENT. THE RESOLUTION IS LIMITED ONLY BY THE SAMPLING RATE ASSIGNED TO THE INSTRUMENT. SIMULTANEOUSLY, THE OTHER PROBE CAN MEASURE NI AT A RATE OF UP TO 50 TO 100 PER SECOND, DEPENDING ON THE TELEMETRY RATE AVAILABLE. AT NOMINAL RATES (1000 BPS) TE AND NE ARE MEASURED ABOUT ONE OR TWO TIMES PER SECOND.

----- DYNAMICS EXPLORER-B, CARIGNAN-----

INVESTIGATION NAME- NEUTRAL ATMOSPHERE COMPOSITION

NSSDC ID- DE-B -03 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - G.R. CARIGNAN U OF MICHIGAN
OI - N.W. SPENCER NASA-GSFC
OI - C.A. REBER NASA-GSFC
OI - A.E. HEDIN NASA-GSFC

BRIEF DESCRIPTION
THE NEUTRAL ATMOSPHERE COMPOSITION SPECTROMETER (NACS) IS DESIGNED TO OBTAIN IN SITU MEASUREMENTS OF THE NEUTRAL ATMOSPHERIC COMPOSITION AND TO STUDY THE VARIATIONS OF THE NEUTRAL ATMOSPHERE IN RESPONSE TO ENERGY COUPLED INTO IT FROM THE MAGNETOSPHERE. BECAUSE TEMPERATURE ENHANCEMENTS, LARGE-SCALE CIRCULATION CELLS, AND WAVE PROPAGATION ARE PRODUCED BY ENERGY INPUT (EACH OF WHICH POSSESSES A SPECIFIC SIGNATURE IN COMPOSITION VARIATION), THE MEASUREMENTS PERMIT THE STUDY OF THE PARTITION, FLOW, AND DEPOSITION OF ENERGY FROM THE MAGNETOSPHERE. THE QUADRUPOLE MASS SPECTROMETER USED IS A NEARLY IDENTICAL FOLLOW-ON TO THOSE FLOWN ON THE AE-C, -D, AND -E MISSIONS. THE ELECTRON IMPACT ION SOURCE IS USED IN A CLOSED MODE. ATMOSPHERIC PARTICLES ENTER INTO AN ANTECHAMBER THROUGH A KNIFE-EDGED ORIFICE, WHERE THEY ARE THERMALIZED TO THE INSTRUMENT TEMPERATURE. THE IONS WITH THE SELECTED CHARGE-TO-MASS RATIOS HAVE STABLE TRAJECTORIES THROUGH THE HYPERBOLIC ELECTRIC FIELD AND EXIT THE ANALYZER AND ENTER INTO THE DETECTION SYSTEM. AN OFF-AXIS BERYLLIUM-COPPER DYNODE MULTIPLIER OPERATING AT A GAIN OF 2.E6 PROVIDES AN OUTPUT PULSE OF ELECTRONS FOR EACH ION ARRIVAL. THE DETECTOR OUTPUT IS A PULSE RATE PROPORTIONAL TO THE NEUTRAL DENSITY IN THE ION SOURCE OF THE SELECTED MASS. THE INSTRUMENT ALSO INCLUDES TWO BAFFLES THAT SCAN ACROSS THE INPUT ORIFICE FOR OPTIONAL MEASUREMENT OF THE TRANSVERSE COMPONENTS OF THE NEUTRAL WIND. THE INSTRUMENT COVERS THE ENTIRE MASS RANGE FROM 1 TO 46 U, BUT NORMALLY IS USED IN A SELECTED MASS STEPPING MODE WHERE MASS NUMBERS 4, 23, 30, 32, AND 40 ARE SAMPLED SEQUENTIALLY WITH A SPATIAL RESOLUTION OF 4 KM. THE TIME RESOLUTION NEEDED TO DETERMINE THE ABUNDANCE OF GAS AT A SINGLE MASS IS 16 MILLISECONDS. OPERATIONAL ALTITUDES ARE BETWEEN 200 KM AND 500 KM WITH REDUCED CAPABILITY AS LOW AS 150 KM AND AS HIGH AS 600 KM.

----- DYNAMICS EXPLORER-B, HANSON-----

INVESTIGATION NAME- RETARDING POTENTIAL ANALYZER

NSSDC ID- DE-B -07 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
ATMOSPHERIC PHYSICS

PERSONNEL
PI - W.B. HANSON U OF TEXAS, DALLAS
OI - R.A. HEELIS U OF TEXAS, DALLAS
OI - D.R. ZUCCARO U OF TEXAS, DALLAS
OI - C.R. LIPPENCOTT U OF TEXAS, DALLAS

BRIEF DESCRIPTION
THE RETARDING POTENTIAL ANALYZER (RPA) PROVIDES DATA ON TEMPERATURE, COMPOSITION, CONCENTRATION, AND THE BULK VELOCITY OF POSITIVE IONS NOMINALLY PARALLEL TO THE VEHICLE VELOCITY. THE MEASURED PARAMETERS OBTAINED FROM THIS INVESTIGATION ARE BASIC TO THE UNDERSTANDING OF MECHANISMS THAT INFLUENCE THE PLASMA; I.E., TO UNDERSTAND THE COUPLING BETWEEN THE SOLAR WIND AND THE EARTH'S ATMOSPHERE. THE ANALYZER DEFINES THE ION TEMPERATURE IN THE REGIONS WHERE THE CONCENTRATION, N(I), IS GREATER THAN 100 IONS PER CUBIC CM, AND DETERMINES THE VALUE OF N(I) FROM ITS MAXIMUM VALUE DOWN TO APPROXIMATELY 10 IONS PER CUBIC CM. THE RPA PROVIDES THE BEST ABSOLUTE VALUE FOR N(I) OF THE IN SITU MEASURING INSTRUMENTS ON THE SPACECRAFT, AND IS ALSO CAPABLE OF MEASURING FRACTIONAL CHANGES IN N(I) OF LESS THAN 0.1 PERCENT WITH HIGH SPATIAL RESOLUTION. THE MEASUREMENTS ARE MADE WITH A MULTIGRIDDED PLANAR RETARDING POTENTIAL ANALYZER VERY SIMILAR IN CONCEPT AND GEOMETRY TO THE INSTRUMENTS CARRIED ON THE AE SATELLITES. A PAIR OF APERTURE GRIDS ARE HELD AT SPACECRAFT GROUND AND A SECOND PAIR OF GRIDS COMPRISES THE RETARDING SWEEP GRID. THE POTENTIAL ON THESE GRIDS DETERMINES THE ENERGY OF THE IONS IN THE SPACECRAFT FRAME OF REFERENCE THAT CAN REACH THE ELECTROMETER COLLECTOR. THE RETARDING POTENTIAL IS VARIED IN DIFFERENT SEQUENCES TO PROVIDE INFORMATION ON THE ION THERMAL ENERGY DISTRIBUTION. THE ELECTRICALLY NEGATIVE SUPPRESSOR GRID BETWEEN THE SWEEP GRID AND THE COLLECTOR SERVES TO SUPPRESS SOLAR UV EJECTED PHOTOELECTRONS BY SENDING THEM BACK TO THE COLLECTOR AND ALSO SHIELDS THE COLLECTOR FROM AMBIENT ELECTRONS. THE ION CURRENT-RETARDING VOLTAGE CHARACTERISTICS ARE ANALYZED BY FITTING THEORETICAL CURVES TO THE DATA ON A COMPUTER USING LEAST SQUARES TECHNIQUES. PARAMETERS THAT ARE DEDUCED FROM THIS PROCESS ARE: ION TEMPERATURE; VEHICLE POTENTIAL; PLASMA DRIFT VELOCITY NORMAL TO THE SENSOR FACE; AND THE CONCENTRATION OF H+, HE+, O+, AND FE+, AND MOLECULAR IONS O2+, NO+, AND N2+.

ORIGINAL PAGE IS
OF POOR QUALITY

----- DYNAMICS EXPLORER-B, HAYS-----

INVESTIGATION NAME- FABRY-PEROT INTERFEROMETER

NSSDC ID- DE-B -05

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL

PI - P.B. HAYS	U OF MICHIGAN
OI - R.G. ROBLE	NATL CTR FOR ATMOS RES
OI - G.R. CARIGHAN	U OF MICHIGAN
OI - A.F. NAGY	U OF MICHIGAN
OI - D. REES	U COLLEGE LONDON

BRIEF DESCRIPTION

THE FABRY-PEROT INTERFEROMETER (FPI) IS A HIGH RESOLUTION INSTRUMENT DESIGNED TO MEASURE THE DRIFT AND TEMPERATURE OF NEUTRAL AND IONIC ATOMIC OXYGEN USING THE DOPPLER TECHNIQUE. ZENITH ANGLE SCANNING PROVIDES WIND DETERMINATIONS AT VARIOUS ALTITUDES BELOW THE SPACECRAFT. THE INFORMATION OBTAINED FROM THIS INVESTIGATION IS USED TO STUDY THE DYNAMIC RESPONSE OF THE THERMOSPHERE TO THE ENERGY SOURCES CAUSED BY MAGNETOSPHERIC ELECTRIC FIELDS AND THE ABSORPTION OF SOLAR ULTRAVIOLET LIGHT IN THE THERMOSPHERE. THE INSTRUMENT IS BASED ON THE VISIBLE AIRGLOW EXPERIMENT (VAE) USED IN THE AE PROGRAM. THE ADDITION OF A SCANNING MIRROR, THE FABRY-PEROT ETALON, AN IMAGE PLANE DETECTOR, AND A CALIBRATION LAMP ARE THE PRINCIPAL DIFFERENCES. FOUR BAND-PASS FILTERS ISOLATE LINES AT 5577 Å, 6300 Å, 7319 Å, AND THE SPECTRAL CALIBRATION LINE. THE BASIC SENSOR IS A FLAT-PLATE FABRY-PEROT INTERFEROMETER, WITH A PLATE DIAMETER OF 3.1 CM AND A PLATE SEPARATION OF 1.27 CM. BECAUSE THE FABRY-PEROT PROVIDES ALL THE NEEDED SPECTRAL INFORMATION IN A CONCENTRIC RING PATTERN ON AN IMAGE PLANE, A SINGLE PHOTON-COUNTING IMAGE DETECTOR IS USED TO ACQUIRE SIMULTANEOUS SPECTRAL INFORMATION. THIS DETECTOR CONSISTS OF A PHOTOCATHODE MICROCHANNEL-PLATE GAIN STAGE AND CONCENTRIC RING ANODES MATCHED TO THE FABRY-PEROT OUTPUT IMAGE. THE RESOLUTION IS 0.0196 Å PER RING, ALLOWING ABSOLUTE MEASUREMENT ACCURACY OF ABOUT 10 M/S FOR THE DRIFT VELOCITY OF NEUTRAL ATOMIC OXYGEN.

----- DYNAMICS EXPLORER-B, HEELIS-----

INVESTIGATION NAME- ION DRIFT METER

NSSDC ID- DE-B -06

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - R.A. HEELIS	U OF TEXAS, DALLAS
OI - W.B. HANSON	U OF TEXAS, DALLAS
OI - D.R. ZUCCARO	U OF TEXAS, DALLAS
OI - C.R. LIPPENCOTT	U OF TEXAS, DALLAS

BRIEF DESCRIPTION

THE ION DRIFT METER (IDM) MEASURES THE BULK MOTIONS OF THE IONOSPHERIC PLASMA PERPENDICULAR TO THE SATELLITE VELOCITY VECTOR. THIS INVESTIGATION YIELDS INFORMATION ON: (1) THE ION CONVECTION (ELECTRIC FIELD) PATTERN IN THE AURORAL AND POLAR IONOSPHERE; (2) THE FLOW OF PLASMA ALONG MAGNETIC FIELD LINES WITHIN THE PLASMASPHERE, WHICH DETERMINES WHETHER THIS MOTION IS SIMPLY A BREATHING OF THE PROTONOSPHERE, A REFILLING OF THIS REGION AFTER A STORM, OR AN INTERHEMISPHERIC TRANSPORT OF PLASMA; (3) THE THERMAL ION CONTRIBUTION TO FIELD-ALIGNED ELECTRIC CURRENTS; (4) VELOCITY FIELDS ASSOCIATED WITH SMALL-SCALE PHENOMENA THAT ARE IMPORTANT AT BOTH LOW AND HIGH LATITUDES; (5) THE MAGNITUDE AND VARIATION OF THE TOTAL CONCENTRATION ALONG THE ORBITAL FLIGHT PATH. THE ION DRIFT METER MEASURES THE PLASMA MOTION PARALLEL TO THE SENSOR FACE BY USING A GRIDDED COLLIMATOR AND MULTIPLE COLLECTORS TO DETERMINE THE DIRECTION OF ARRIVAL OF THE PLASMA. THE INSTRUMENT GEOMETRY IS VERY SIMILAR TO THAT USED ON THE AE-C SATELLITE. TWO LOGARITHMIC AMPLIFIERS AND ONE LINEAR DIFFERENCE AMPLIFIER ARE USED WITH THE DRIFT METER. THE LOGARITHMIC AMPLIFIERS CAN BE CONNECTED TO DIFFERENT PAIRS OF THE COLLECTOR SEGMENTS AND PROVIDE THE INPUT TO THE DIFFERENCE AMPLIFIER. THE OUTPUT FROM THE DIFFERENCE AMPLIFIER IS PROPORTIONAL TO THE RATIO OF THE CURRENTS TO THE PAIRS OF COLLECTOR SEGMENTS. IF THE DIRECTION OF ARRIVAL OF THE PLASMA IS NOT NORMAL TO THE SENSOR FACE, THEN THE ION CURRENT IS ASYMMETRICALLY DISTRIBUTED OVER THE FOUR COLLECTOR SEGMENTS. IN THE ABSENCE OF ANY EXTERNAL ELECTRIC FIELDS OR NEUTRAL WINDS, THE ANGLE OF ARRIVAL OF THE PLASMA AT THE SENSOR FACE IS DETERMINED SOLELY BY THE ATTITUDE OF THE SENSOR RELATIVE TO THE SPACECRAFT VELOCITY VECTOR. IF THE SPACECRAFT ATTITUDE, VELOCITY, AND THE POSITION OF THE SENSOR ON THE SURFACE ARE ACCURATELY KNOWN, THEN ANY DEVIATION (RECORDED BY THE DRIFT METER) FROM THE EXPECTED ANGLE OF ARRIVAL OF THE PLASMA MAY BE INTERPRETED IN TERMS OF PLASMA MOTION CAUSED BY ELECTRIC FIELDS OR NEUTRAL WINDS. IN ADDITION TO MEASURING THE ANGLE OF ARRIVAL OF THE PLASMA AT THE SENSOR FACE, IT IS POSSIBLE TO MONITOR THE TOTAL ION CONCENTRATION BECAUSE THE SUM OF THE CURRENTS TO THE TWO LOGARITHMIC AMPLIFIERS IS VERY NEARLY PROPORTIONAL TO THIS QUANTITY.

----- DYNAMICS EXPLORER-B, HOFFMAN-----

INVESTIGATION NAME- LOW ALTITUDE PLASMA INVESTIGATION HIGH ANGULAR RESOLUTION

NSSDC ID- DE-B -13

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
ATMOSPHERIC PHYSICS

PERSONNEL

PI - R.A. HOFFMAN	NASA-GSFC
OI - J.D. WINNINGHAM	U OF TEXAS, DALLAS
OI - D.M. KLUMPAR	U OF TEXAS, DALLAS
OI - J.L. BURCH	U OF TEXAS, SAN ANTONIO

BRIEF DESCRIPTION

THIS INVESTIGATION USES THE SUPRATHERMAL PARTICLE DISTRIBUTION FUNCTIONS MEASURED BY BOTH THE HIGH (DE-A-05) AND LOW (DE-B-08) ALTITUDE PLASMA INSTRUMENTS. THE PURPOSES ARE TO: (1) STUDY THE PROPERTIES AND LOCATIONS OF AURORAL ACCELERATION MECHANISMS, (2) DETERMINE THE NATURE AND DISTRIBUTION OF ELECTRIC FIELDS PARALLEL TO THE MAGNETIC FIELD, (3) IDENTIFY THE CHARGE CARRIERS OF THE MAJOR ELECTRIC CURRENT SYSTEMS COUPLING THE MAGNETOSPHERE AND IONOSPHERE, AND (4) DETERMINE RELATIONS BETWEEN THESE QUANTITIES, AND THE CONVECTION ELECTRIC FIELD AND AURORAL LIGHT EMISSION PATTERNS.

----- DYNAMICS EXPLORER-B, MAYNARD-----

INVESTIGATION NAME- ELECTRIC FIELD INVESTIGATIONS

NSSDC ID- DE-B -02

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - N.C. MAYNARD	NASA-GSFC
OI - J.P. HEPNER	NASA-GSFC

BRIEF DESCRIPTION

THE VECTOR ELECTRIC FIELD INSTRUMENT (VEFI) USES FLIGHT-PROVEN DOUBLE-PROBE TECHNIQUES WITH 20-M BASELINES TO OBTAIN VECTOR MEASUREMENTS OF DC ELECTRIC FIELDS. THIS ELECTRIC FIELD INVESTIGATION PROVIDES THE DATA NECESSARY TO MEET THE FOLLOWING OBJECTIVES: (1) TO OBTAIN ACCURATE AND COMPREHENSIVE TRIAXIAL DC ELECTRIC FIELD MEASUREMENTS AT IONOSPHERIC ALTITUDES IN ORDER TO REFINE THE BASIC SPATIAL PATTERNS, DEFINE THE LARGE-SCALE TIME HISTORY OF THESE PATTERNS, AND STUDY THE SMALL-SCALE TEMPORAL AND SPATIAL VARIATIONS WITHIN THE OVERALL PATTERNS; (2) TO STUDY THE DEGREE TO WHICH AND IN WHAT REGION THE ELECTRIC FIELD PROJECTS TO THE EQUATORIAL PLANE; (3) TO OBTAIN MEASUREMENTS OF ELF AND LOWER-FREQUENCY IRREGULARITY STRUCTURES; AND (4) TO PERFORM NUMEROUS CORRELATIVE STUDIES. THE INSTRUMENT CONSISTS OF SIX CYLINDRICAL ELEMENTS 11 M LONG AND 28 MM IN DIAMETER FOR EACH OF THE SIX ANTENNAS NECESSARY FOR THE AXIS MEASUREMENT. EACH ANTENNA IS INSULATED FROM THE PLASMA EXCEPT FOR THE OUTER 2 M. THE BASELINE, OR DISTANCE BETWEEN THE MIDPOINTS OF THESE 2-M ACTIVE ELEMENTS IS 20 M. THE ANTENNAS ARE INTERLOCKED ALONG THE EDGES TO PREVENT OSCILLATION (CAUSED BY THERMAL PUMPING) AND TO INCREASE THEIR RIGIDITY AGAINST DRAG FORCES. THE BASIC ELECTRONIC SYSTEM IS VERY SIMILAR IN CONCEPT TO THAT USED ON IMP-J AND ISEE 1, BUT MODIFIED FOR A THREE-AXIS MEASUREMENT ON A NONSPINNING SPACECRAFT. AT THE CORE OF THE SYSTEM ARE THE HIGH IMPEDANCE (1.612 OHM) PREAMPLIFIERS WHOSE OUTPUT ARE ACCURATELY SUBTRACTED AND DIGITIZED (14-BIT A-D CONVERSION FOR SENSITIVITY TO 0.1 MICROVOLT/M) TO MAINTAIN HIGH RESOLUTION FOR SUBSEQUENT REMOVAL OF THE CROSS-PRODUCT OF THE VECTORS V AND B IN DATA PROCESSING. THIS PROVIDES THE BASIC DC MEASUREMENT. OTHER CIRCUITRY IS USED TO AID IN INTERPRETING THE DC DATA AND TO MEASURE RAPID VARIATIONS IN THE SIGNALS DETECTED BY THE ANTENNAS.

----- DYNAMICS EXPLORER-B, MAYR-----

INVESTIGATION NAME- ATMOSPHERIC DYNAMICS AND ENERGETICS INVESTIGATION

NSSDC ID- DE-B -12

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL

PI - H.G. MAYR	NASA-GSFC
OI - G.P. NEWTON	NASA-GSFC

BRIEF DESCRIPTION

THE PURPOSE OF THIS INVESTIGATION IS TO STUDY THE DYNAMIC RESPONSES OF THE THERMOSPHERE AND IONOSPHERE TO ENERGY DEPOSITION IN THE FORM OF JOULE HEATING, PARTICLE PRECIPITATION, AND MOMENTUM TRANSFER BY ELECTRIC FIELD-GENERATED DRIFTS. THE OBJECTIVE IS TO DETERMINE THE RELATIVE IMPORTANCE OF THE VARIOUS PHENOMENA AND THE CONDITIONS UNDER WHICH ORDERING OCCURS. BECAUSE THE RELATIVE IMPORTANCE OF THE DIFFERENT PROCESSES VARIES WITH GEOMAGNETIC ACTIVITY, BOTH GEOMAGNETICALLY QUIET AND DISTURBED CONDITIONS ARE

EXAMINED. USING THEORETICAL MODELS AS TOOLS, THE PRINCIPAL GOAL IS TO QUANTITATIVELY ANALYZE THE PHYSICAL PROCESSES INVOLVED IN THE ENERGY COUPLING BETWEEN THE MAGNETOSPHERE AND THE THERMOSPHERE. IN ADDITION TO DATA OBTAINED FROM VARIOUS DE SATELLITE INSTRUMENTS, THE INVESTIGATION USES GROUND-BASED CORRELATIVE MEASUREMENTS.

----- DYNAMICS EXPLORER-B, NAGY-----

INVESTIGATION NAME- MAGNETOSPHERIC ENERGY COUPLING TO THE ATMOSPHERE INVESTIGATION

NSSDC ID- DE-B -10 INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
ATMOSPHERIC PHYSICS

PERSONNEL
PI - A.F. NAGY U OF MICHIGAN

BRIEF DESCRIPTION
THIS INVESTIGATION, USING VARIOUS DATA FROM VARIOUS SPACECRAFT INSTRUMENTS, STUDIES: (1) GLOBAL THERMOSPHERIC DYNAMICS (THE EFFECTS OF ENERGY INPUT TO THE THERMOSPHERE FROM THE MAGNETOSPHERE BY CONVECTION, JOULE HEATING, PARTICLE PRECIPITATION AND TIDAL ENERGY), (2) THE CONVECTIVE COUPLING OF THE THERMAL PLASMA BETWEEN THE IONOSPHERE AND MAGNETOSPHERE; AND (3) THE ENERGY-LOSS MECHANISMS OF IONOSPHERIC PHOTOELECTRONS IN THE PLASMASPHERE.

----- DYNAMICS EXPLORER-B, ROBLE-----

INVESTIGATION NAME- NEUTRAL-PLASMA INTERACTIONS INVESTIGATION

NSSDC ID- DE-B -11 INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - R.G. ROBLE NATL CTR FOR ATMOS RES

BRIEF DESCRIPTION
THIS INVESTIGATION, USING DATA FROM VARIOUS SPACECRAFT INSTRUMENTS, STUDIES THE LARGE-SCALE NEUTRAL-PLASMA INTERACTIONS IN THE THERMOSPHERE CAUSED BY MAGNETOSPHERIC-IONOSPHERIC AND THERMOSPHERIC COUPLING PROCESSES. MODELS ARE USED TO PROVIDE A THEORETICAL FRAMEWORK IN WHICH CERTAIN IMPORTANT IONOSPHERIC AND ATMOSPHERIC PROPERTIES NEEDED FOR COUPLING PROCESSES (SUCH AS THE PEDERSEN AND HALL CONDUCTIVITIES) MAY BE CONSISTENTLY CALCULATED USING SATELLITE DATA MEASURED AT A GIVEN HEIGHT. THESE MODELS ARE USED TO CALCULATE VERTICAL PROFILES OF IONOSPHERIC PROPERTIES THAT ARE USEFUL FOR COMPARISON WITH INCOHERENT SCATTER RADAR MEASUREMENTS AND OTHER GROUND-BASED SUPPORTING DATA. THE DATA ARE USED TO IDENTIFY AND EVALUATE THE NEUTRAL THERMOSPHERIC HEAT AND MOMENTUM SOURCES, AND TO DETERMINE THE EFFECTIVENESS OF HIGH LATITUDE DYNAMIC PROCESSES IN CONTROLLING THE GLOBAL THERMOSPHERIC CIRCULATION AND THERMAL STRUCTURE.

----- DYNAMICS EXPLORER-B, SPENCER-----

INVESTIGATION NAME- WIND AND TEMPERATURE

NSSDC ID- DE-B -04 INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - N.W. SPENCER NASA-GSFC
OI - A.E. HEDIN NASA-GSFC
OI - W.R. HOEGY NASA-GSFC
OI - H.B. NIEMANN NASA-GSFC
OI - R.F. THEIS NASA-GSFC
OI - G.R. CARIGNAN U OF MICHIGAN

BRIEF DESCRIPTION
THE WIND AND TEMPERATURE SPECTROMETER (WATS) MEASURES THE IN SITU NEUTRAL WINDS, THE NEUTRAL PARTICLE TEMPERATURES, AND THE CONCENTRATIONS OF SELECTED GASES. THE OBJECTIVE OF THIS INVESTIGATION IS TO STUDY THE INTERRELATIONSHIPS AMONG THE WINDS, TEMPERATURES, PLASMA DRIFT, ELECTRIC FIELDS, AND OTHER PROPERTIES OF THE THERMOSPHERE THAT ARE MEASURED BY OTHER INSTRUMENTS ON THE SPACECRAFT. KNOWLEDGE OF HOW THESE PROPERTIES ARE INTERRELATED HELPS IN EXPLAINING THE CONSEQUENCES OF THE ACCELERATION OF NEUTRAL PARTICLES BY THE IONS IN THE IONOSPHERE, THE ACCELERATION OF IONS BY NEUTRALS CREATING ELECTRIC FIELDS, AND THE RELATED ENERGY TRANSFER BETWEEN THE IONOSPHERE AND THE MAGNETOSPHERE. THREE COMPONENTS OF THE WIND, ONE NORMAL TO THE SATELLITE VELOCITY VECTOR IN THE HORIZONTAL PLANE, ONE VERTICAL, AND ONE IN THE SATELLITE DIRECTION ARE MEASURED. A RETARDING POTENTIAL QUADRUPOLE MASS SPECTROMETER, COUPLED TO THE ATMOSPHERE THROUGH A PRECISELY ORIFICED ANTICHAMBER, IS USED. IT CAN BE OPERATED IN EITHER OF TWO MODES, ONE EMPLOYING THE RETARDING CAPABILITY AND THE OTHER USING THE ION SOURCE AS A CONVENTIONAL NONRETARDING SOURCE. TWO SCANNING BAFFLES ARE USED IN FRONT OF THE MASS SPECTROMETER, ONE MOVING VERTICALLY IN FRONT OF THE SENSOR AND

ONE MOVING HORIZONTALLY. THE MAGNITUDES OF THE HORIZONTAL AND VERTICAL COMPONENTS OF THE WIND NORMAL TO THE SPACECRAFT VELOCITY VECTOR ARE COMPUTED FROM MEASUREMENTS OF THE ANGULAR RELATIONSHIP BETWEEN THE NEUTRAL PARTICLE STREAM AND THE SENSOR. THE COMPONENT OF THE TOTAL STREAM VELOCITY IN THE SATELLITE DIRECTION IS MEASURED DIRECTLY BY THE SPECTROMETER SYSTEM THROUGH DETERMINATION OF THE REQUIRED RETARDING POTENTIAL.

----- DYNAMICS EXPLORER-B, SUGIURA-----

INVESTIGATION NAME- MAGNETIC FIELD OBSERVATIONS

NSSDC ID- DE-B -01 INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
ATMOSPHERIC PHYSICS

PERSONNEL
PI - M. SUGIURA NASA-GSFC
OI - B.G. LEDLEY NASA-GSFC
OI - W.H. FARTHING NASA-GSFC
OI - L.J. CAHILL, JR. U OF MINNESOTA

BRIEF DESCRIPTION
A FLUXGATE MAGNETOMETER (MAG-B) SIMILAR TO ONE ON BOARD DE-A (DE-A-01), IS USED TO OBTAIN MAGNETIC FIELD DATA NEEDED TO STUDY THE MAGNETOSPHERE-IONOSPHERE-ATMOSPHERE COUPLING. THE PRIMARY OBJECTIVES OF THIS INVESTIGATION ARE TO MEASURE FIELD-ALIGNED CURRENTS IN THE AURORAL OVAL AND OVER THE POLAR CAP AT TWO DIFFERENT ALTITUDES USING THE TWO SPACECRAFT, AND TO CORRELATE THESE MEASUREMENTS WITH OBSERVATIONS OF ELECTRIC FIELDS, PLASMA WAVES, SUPRATHERMAL PARTICLES, THERMAL PARTICLES, AND AURORAL IMAGES OBTAINED FROM INVESTIGATION DE-A-03. THE SENSOR IS A THREE-AXIS FLUXGATE MAGNETOMETER WITH DIGITAL COMPENSATION OF THE AMBIENT FIELD IN PRECISE 8.E3 NT (8.E3 GAMMAS) INCREMENTS. THE INSTRUMENT INCORPORATES ITS OWN 12-BIT A-D CONVERTER, 4-BIT DIGITAL COMPENSATION REGISTER FOR EACH AXIS, AND A SYSTEM CONTROL TO GENERATE A 48-BIT DATA WORD CONSISTING OF A 16-BIT REPRESENTATION OF THE FIELD MEASURED ALONG EACH OF THREE MAGNETOMETER AXES. TRACK AND HOLD MODULES ARE USED TO OBTAIN SIMULTANEOUS SAMPLES ON ALL THREE AXES. THE INSTRUMENT BANDWIDTH IS 25 HZ. MAXIMUM POSSIBLE ERRORS FROM INSTRUMENTAL SOURCES ARE CONSERVATIVELY ESTIMATED WITHIN 0.005 PERCENT OF READING AND 5 NT (5 GAMMAS) IN HIGH FIELD REGIONS.

----- DYNAMICS EXPLORER-B, WINNINGHAM-----

INVESTIGATION NAME- LOW ALTITUDE PLASMA INSTRUMENT

NSSDC ID- DE-B -08 INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - J.D. WINNINGHAM U OF TEXAS, DALLAS
OI - D.W. KLUMPAR U OF TEXAS, DALLAS
OI - R.A. HOFFMAN NASA-GSFC
OI - J.L. BURCH U OF TEXAS, SAN ANTONIO

BRIEF DESCRIPTION
THE LOW ALTITUDE PLASMA INSTRUMENT (LAPI) PROVIDES HIGH-RESOLUTION MEASUREMENTS OF POSITIVE IONS AND ELECTRONS FROM 5 EV TO 25 KEV. DATA FROM THIS INVESTIGATION AND SUPPORTING MEASUREMENTS ARE USED TO STUDY: (1) THE IDENTIFICATION AND INTENSITIES OF BIRKELAND CURRENTS, (2) AURORAL PARTICLE SOURCE REGIONS AND ACCELERATION MECHANISMS, (3) THE EXISTENCE AND ROLE OF E PARALLEL TO B, (4) SOURCES AND EFFECTS OF POLAR CAP PARTICLE FLUXES, (5) THE TRANSPORT OF PLASMA WITHIN AND THROUGH THE MAGNETOSPHERIC CUSPS, (6) DYNAMIC CONFIGURATIONS OF HIGH LATITUDE FLUX TUBES, (7) LOSS CONE EFFECTS OF WAVE-PARTICLE INTERACTIONS, (8) HOT-COLD PLASMA INTERACTIONS, (9) IONOSPHERIC EFFECTS OF PARTICLE PRECIPITATION, AND (10) PLASMA CONVECTION AT HIGH ALTITUDES. THE INSTRUMENT CONTAINS AN ARRAY OF UP TO 15 ELECTROSTATIC ANALYZERS OF THE ISIS 2 TYPE, EACH WITH AN ELECTRON CHANNEL AND MOST WITH AN ION CHANNEL, IN ORDER TO OBTAIN DETAILED PITCH ANGLE DISTRIBUTIONS AS A FUNCTION OF ENERGY. THE BASIC MODE OF OPERATION PROVIDES A 32-POINT ENERGY SPECTRUM EVERY SECOND FROM EACH SENSOR, BUT THE VOLTAGES ON THE ELECTROSTATIC ANALYZER ARE PROGRAMMABLE TO ALLOW FOR HIGHER TIME RESOLUTION OVER LIMITED PORTIONS OF THE ENERGY SPECTRUM. THE INSTRUMENT IS MOUNTED ON A SIMPLE ONE-AXIS SCAN PLATFORM ORIENTED SO THAT ONE DETECTOR IS ALWAYS MEASURING PARTICLES WITH PITCH ANGLES OF LESS THAN 1 DEG.

***** ERBS-A*****

SPACECRAFT COMMON NAME- ERBS-A
ALTERNATE NAMES- AEM-D, EARTH RAD BUDGET SAT

NSSDC ID- ERBS-A

LAUNCH DATE- 1 QTR 83
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

WEIGHT- KG

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 96.6 MIN
PERIAPSIS- 600. KM ALT

INCLINATION- 57. DEG
APOAPSIS- 600. KM ALT

PERSONNEL
PM - G.L. WAGNER, JR. NASA-GSFC

BRIEF DESCRIPTION

THE EARTH RADIATION BUDGET SATELLITE (ERBS) IS A 2-YR MISSION TO GATHER REQUIRED RADIATION BUDGET DATA, AEROSOL DATA, OZONE DATA (RELATED TO THE CHLORINE CHEMISTRY PROCESS), AND TO ASSESS CLIMATE CHANGE AND OZONE DEPLETION. THE EXPERIMENTS ARE THE EARTH RADIATION BUDGET EXPERIMENT (ERBE), THE STRATOSPHERIC AEROSOL AND GAS EXPERIMENT II (SAGE II), AND THE HALOGEN OCCULTATION EXPERIMENT (HALOE). THE ERBE WILL BE CARRIED ON TWO TIROS-N SERIES MISSIONS.

----- ERBS-A, BROOME-----

INVESTIGATION NAME- EARTH RADIATION BUDGET INSTRUMENT (ERBI)

NSSDC ID- ERBS-A -01 INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
TL - G.C. BROOME NASA-LARC
TM - A.A. RUDMANN NASA-GSFC

BRIEF DESCRIPTION

THE EARTH RADIATION BUDGET SATELLITE SYSTEM (ERBS) IS DESIGNED TO MEASURE THE ENERGY EXCHANGE BETWEEN THE EARTH-ATMOSPHERE SYSTEM AND SPACE. THESE MEASUREMENTS ARE IMPORTANT FOR CLIMATE PREDICTION AND IN DEVELOPING STATISTICAL RELATIONSHIPS BETWEEN REGIONAL WEATHER AND RADIATION BUDGET ANOMALIES. THE EARTH RADIATION BUDGET EXPERIMENTS WILL BE FLOWN ON BOTH NOAA AND ERBS SATELLITES TO MEASURE REGIONAL RADIATION BUDGETS AND EQUATOR-TO-POLE GRADIENTS OF NET RADIATION. THE EARTH RADIATION BUDGET INSTRUMENT (ERBI) CONSISTS OF EIGHT CHANNELS DISTRIBUTED WITHIN TWO INSTRUMENT PACKAGES: THE WIDE AND MEDIUM FIELD OF VIEW INSTRUMENT (W/MFOV) AND THE SCANNER INSTRUMENT. THE W/MFOV IS A FIVE CHANNEL RADIOMETER. FOUR CHANNELS ARE PRIMARILY EARTH-VIEWING, BUT UPON COMMAND CAN BE POINTED TOWARD THE SUN FOR PERIODIC CALIBRATION. THE FIFTH CHANNEL IS FIXED FOR CONTINUOUS OBSERVATION OF THE SUN FOR CALIBRATION. TWO OF THE FOUR GIMBALED SENSORS ARE WIDE-ANGLED AND VIEW THE ENTIRE EARTH FROM LIMB TO LIMB, APPROXIMATELY 135 DEG. THESE DETECTORS HAVE BROADBAND SPECTRAL RESPONSES VARYING FROM 0.2 MICROMETERS TO OVER 50 MICROMETERS. CHANNEL 1 MAKES TOTAL RADIATION MEASUREMENTS WHILE CHANNEL 2, WITH ITS FILTER ATTACHED, MAKES MEASUREMENTS OVER THE SHORTWAVE SPECTRAL BAND CHARACTERIZED BY THE SUPRASIL-W DOME FILTER WHICH CUTS OFF AT 5 MICROMETERS. THE REMAINING TWO GIMBALED SENSORS ARE MEDIUM FIELD OF VIEW CHANNELS WITH AN 88-DEG FIELD OF VIEW, EQUIVALENT TO A TEXAS-SIZE FOOTPRINT. CHANNEL 3 MEASURES TOTAL RADIATION WHILE CHANNEL 4, PLACED UNDER A SUPRASIL-W DOME, MEASURES THE SHORTWAVE SPECTRAL BAND. THE EARTH-EMITTED LONGWAVE RADIATION COMPONENT IS DETERMINED BY SUBTRACTING THE SHORTWAVE CHANNEL FROM THE TOTAL CHANNEL. THE SOLAR CHANNEL (5) HAS A 10-DEG FIELD OF VIEW MEASURING THE TOTAL SOLAR SPECTRAL RANGE OF THE SUN. THE SCANNER INSTRUMENT IS A SMALL SPATIAL RESOLUTION (FOV EQUALS 3 DEG DIAMETER) SCANNING RADIOMETER CONTAINING THREE SEPARATE CHANNELS (6,7,8). CHANNEL 6 ISOLATES THE SHORTWAVE SPECTRAL INTERVAL (0.2 TO 5 MICROMETERS). CHANNEL 7 MEASURES THE LONGWAVE SPECTRAL REGION (5 TO 50 MICROMETERS), AND CHANNEL 8 (1.6 MICROMETERS) PROVIDES CLOUD IMAGERY TO AID IN ANALYZING CHANNEL 6 AND 7 DATA. ALL THREE SENSORS ARE LOCATED WITHIN A CONTINUOUSLY ROTATING SCAN DRUM WHICH SCANS THE FOV ACROSS TRACK SEQUENTIALLY FROM HORIZON TO HORIZON AND FROM A SPACE VIEW FOR CALIBRATION. ADDITIONAL INFORMATION CAN BE OBTAINED FROM 'SYSTEM CONSIDERATIONS FOR AN EARTH RADIATION BUDGET SCANNING RADIOMETER,' AND 'THE EARTH RADIATION BUDGET SATELLITE SYSTEM OF THE EARLY 1980'S.'

----- ERBS-A, MCCORMICK-----

INVESTIGATION NAME- STRATOSPHERIC AEROSOL AND GAS (SAGE)

NSSDC ID- ERBS-A -02 INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - H.P. MCCORMICK NASA-LARC
OI - J.E. PLEASANTS NASA-LARC

BRIEF DESCRIPTION

THE SAGE II SENSOR IS A MULTI-SPECTRAL CHANNEL RADIOMETER WHICH MEASURES THE EXTINCTION OF SOLAR RADIATION INTENSITY DURING SOLAR OCCULTATION. AS THE SPACECRAFT EMERGES FROM THE EARTH'S SHADOW DURING EACH ORBIT, THE SENSOR WILL ACQUIRE THE SUN AND MEASURE THE SOLAR INTENSITY IN WAVELENGTH BANDS CENTERED BETWEEN 0.385 MICROMETERS AND 1.0 MICROMETERS AS IT SCANS THE SUN VERTICALLY. AS THE SPACECRAFT CONTINUES IN ORBIT, THE LINE OF SIGHT FROM THE SPACECRAFT TO THE RISING SUN WILL SCAN THE EARTH'S ATMOSPHERE RESULTING IN A MEASUREMENT OF THE ATTENUATED SOLAR INTENSITY AT DIFFERENT ATMOSPHERIC LAYERS. THE PROCEDURE WILL THEN BE REPEATED IN A REVERSE SENSE DURING SPACECRAFT SUNSET. EACH SUNRISE AND SUNSET EVENT WILL BE MONITORED FROM THE TOP OF THE CLOUDS TO APPROXIMATELY 150 KM ABOVE THE EARTH'S SURFACE. THE SENSOR WILL HAVE AN INSTANTANEOUS FIELD OF VIEW OF APPROXIMATELY 0.5 KM MEASURED AT THE HORIZON FOR A 600-KM ORBIT. THE DYNAMIC RANGE OF EACH RADIOMETRIC CHANNEL IS APPROXIMATELY 4000 AND THE UNCERTAINTY IN ANY RADIOMETRIC MEASUREMENT IS SPECIFIED TO BE LESS THAN 0.1 PERCENT OF THE UNATTENUATED SOLAR INTENSITY (THE SENSOR IS PARTIALLY SELF-CALIBRATING IN THAT A MEASUREMENT OF THE UNATTENUATED SOLAR INTENSITY IS MADE PRIOR TO EACH SPACECRAFT SUNSET AND FOLLOWING EACH SPACECRAFT SUNRISE). FURTHERMORE, ZERO INTENSITY LEVELS ARE REACHED EVERY TIME THE ELEVATION MIRROR SCANS OFF THE SUN. THE INSTRUMENT MODULE CONSISTS OF OPTICAL AND ELECTRONIC SUBASSEMBLIES MOUNTED SIDE BY SIDE. THE OPTICAL SUBASSEMBLY CONSISTS OF A FLAT SCANNING MIRROR, CASSEGRAIN OPTICS, AND A DETECTOR PACKAGE. THE ENTIRE OPTICAL SUBASSEMBLY IS GIMBALED IN AZIMUTH. THE AZIMUTH SERVO EMPLOYS SUN SENSORS DRIVEN TO NULL ON THE CENTER OF THE SUN TO A TOLERANCE OF PLUS OR MINUS 1 ARC MIN. AT THE BEGINNING OF A SUNRISE OR SUNSET EVENT, THE INSTRUMENT SLEWS IN AZIMUTH TO A POSITION TO ACQUIRE THE SUN. UPON ACQUISITION IN AZIMUTH, THE MIRROR SERVO SCANS IN ELEVATION UNTIL THE SUN IS ACQUIRED. THE SCAN RANGE IS THEN REDUCED TO SCANNING BACK AND FORTH ACROSS THE SOLAR IMAGE ONLY. THE SOLAR INPUT IS REFLECTED FROM THE SCAN MIRROR THROUGH THE CASSEGRAIN TELESCOPE WHICH PRODUCES A SOLAR IMAGE UPON THE SCIENCE DETECTOR APERTURE. THIS IMAGE IS SCANNED ACROSS THE APERTURE BY THE MOTION OF THE SCAN MIRROR. THE RADIATION THROUGH THE APERTURE IS DISPERSED AND THE BEAMS REPRESENTING THE WAVELENGTH BANDS ARE THEN COLLECTED AND APPLIED TO SILICON PIN DIODE DETECTORS. THE OUTPUTS OF THE DETECTORS ARE FED TO SIGNAL CONDITIONING AMPLIFIERS WHOSE OUTPUTS GO TO THE PCM ENCODER. THE PCM ENCODER MULTIPLEXES AND DIGITIZES THE SIGNALS AND THEN TRANSFERS THE DIGITAL DATA TO THE ERBS DATA SYSTEM. THE RADIOMETRIC DATA FOR EACH WAVELENGTH CHANNEL WILL BE SAMPLED 64 TIMES PER S OR APPROXIMATELY 4 TIMES PER KM OF TANGENT ALTITUDE, AND DIGITIZED TO 12 BITS; THESE DATA PLUS SCIENCE SUPPORTING DATA AND INSTRUMENT MODULE HOUSEKEEPING DATA TOTAL APPROXIMATELY 6 KSPS.

----- ERBS-A, RUSSELL, 3RD-----

INVESTIGATION NAME- HALOGEN OCCULTATION (HALOE)

NSSDC ID- ERBS-A -03 INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - J.W. RUSSELL, 3RD NASA-LARC
OI - C.W. COFFEE, JR. NASA-LARC

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTS OF AN OPTICS UNIT, SUPPORTED ON A TWO-AXIS GIMBAL, AND AN ELECTRONICS UNIT. THE OPTICS UNIT CONTAINS THE OPTICS, MODULATORS, DETECTORS, AND PREAMPS FOR THE GAS DETECTION CHANNELS AND RADIOMETER CHANNELS. THE GIMBAL ASSEMBLY PROVIDES AZIMUTH AND ELEVATION ROTATION OF THE OPTICS UNIT WITH, PLUS OR MINUS 185 DEG AZIMUTH RANGE AND A 38 DEG RANGE OF ELEVATION ANGLE CONTROL, AND IS CONTROLLED BY COARSE AND FINE SUN SENSORS INCLUDED IN THE OPTICS UNIT. THE ELECTRONICS UNIT PROVIDES SIGNAL PROCESSING, MOTOR DRIVES, SEQUENCE TIMING, MODE CONTROL, POWER CONDITIONING, AND DATA HANDLING. A 16-CM-DIAMETER REFLECTIVE CASSEGRAIN TELESCOPE COLLECTS ENERGY FOR THE GAS DETECTION CHANNELS. THE INSTANTANEOUS FIELD OF VIEW (IFOV) IS DETERMINED BY A FIELD STOP AT THE FOCAL POINT OF THE TELESCOPE, AND THE ENERGY IS MODULATED BY A CHOPPER SIMILAR TO THAT OF THE MONITORING AIR POLLUTION FROM SATELLITES (MAPS) INSTRUMENT. A HOT REFERENCE BLACKBODY SOURCE IS USED TO APPROXIMATELY BALANCE THE SOLAR ENERGY LEVELS WHEN THE CHOPPER DISC IS IN THE CLOSED (REFLECTIVE) POSITION. AN OPTICAL SIGNAL PROVIDED AND PROCESSED IN A SIMILAR MANNER AS THE MAPS INSTRUMENT IS USED TO MAINTAIN GAIN BALANCE OF THE DETECTOR BRANCHES. THE OPTICAL BEAM IS SEPARATED BY BEAMSPLITTERS INTO THE GAS CORRELATION AND RADIOMETER MODULES. THE OUTPUT SIGNALS FROM THE GAS CORRELATION MODULES ARE SENT TO THE SIGNAL PROCESSOR, WHICH IS SIMILAR TO THE MAPS SIGNAL PROCESSOR DESIGN. THE OUTPUT SIGNALS FROM THE RADIOMETER MODULES ARE SENT TO A STANDARD RADIOMETER SIGNAL PROCESSOR. A STEPPERDRIVEN CALIBRATION WHEEL IS PROVIDED IN FRONT OF THE TELESCOPE FIELD STOP TO PROVIDE MEASUREMENTS OF GAS RESPONSE, RADIOMETRIC CALIBRATION, AND INSTRUMENT BALANCE, USING THE EXOATMOSPHERIC SUN AS AN ENERGY SOURCE. THE CALIBRATION WHEEL CONTAINS THREE GAS CELLS AND A NEUTRAL DENSITY FILTER FOR THESE MEASUREMENTS. THE SIGNAL PROCESSING AND MOTOR DRIVE ELECTRONICS ARE SIMILAR TO THOSE OF THE MAPS INSTRUMENT. THE REMAINING ELECTRONICS ARE

CONVENTIONAL AND STRAIGHT FORWARD WITH NO CRITICAL DESIGN AREAS. THE PROPOSED GIMBAL ASSEMBLY IS A STEPPER DRIVEN, TWO-AXIS (AZIMUTH, ELEVATION) ASSEMBLY THAT SUPPORTS THE OPTICS UNIT NEAR THE CENTER OF GRAVITY OF THE INSTRUMENT. THE GIMBALS PROVIDE A CAPABILITY FOR FINE TRACKING. TRACKING CONTROL SIGNALS FOR THE GIMBALS ARE DERIVED FROM THE SUN SENSORS. THE FINE SUN SENSOR IS A TWO-AXIS DIGITAL SENSOR USING RETICON LINEAR ARRAY DETECTORS WITH 256 ELEMENTS PER AXIS GIVING .33 ARC MIN RESOLUTION. THE COARSE SUN SENSOR IS AN ANALOG, TWO-AXIS DEVICE SIMILAR TO AN EXISTING ADCOLE SUN SENSOR. THE COARSE SENSOR PROVIDES SUN ACQUISITION SIGNALS OVER A PLUS OR MINUS 10 DEG FOV.

***** EUVE*****

SPACECRAFT COMMON NAME- EUVE
ALTERNATE NAMES- EXTREME UV EXPLORER, BERKSAT
NSSDC ID- EUVE

LAUNCH DATE- 10/00/85 WEIGHT- 400. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 95.0 MIN INCLINATION- 28.5 DEG
PERIAPSIS- 550. KM ALT APOAPSIS- 550. KM ALT

PERSONNEL
MG - L. DONDEY NASA HEADQUARTERS
SC - A.G. OPP NASA HEADQUARTERS
PM - S.E. WILLIS NASA-GSFC
PS - C.S. BOWYER U OF CALIF, BERKELEY

BRIEF DESCRIPTION
EXTREME ULTRAVIOLET EXPLORER (EUVE) IS A DOME-SHAPED SPINNING SPACECRAFT DESIGNED TO ROTATE ABOUT THE EARTH/SUN LINE. THE DIRECTION OF THE SPIN AXIS IS ALTERED THROUGH MAGNETIC TORQUING. THE SPACECRAFT OBJECTIVE IS TO CARRY OUT A FULL-SKY SURVEY IN THE EXTREME ULTRAVIOLET RANGE OF THE SPECTRUM BETWEEN 75 AND 550 A, FOR PURPOSES OF DISCOVERING AND STUDYING ULTRAVIOLET SOURCES RADIATING IN THIS REGION AND TO ANALYZE EFFECTS ON THE RADIATION FROM THESE SOURCES CAUSED BY THE INTERSTELLAR MEDIUM.

----- EUVE, BOWYER-----

INVESTIGATION NAME- EXTREME ULTRAVIOLET FULL SKY SURVEY

NSSDC ID- EUVE -01 INVESTIGATIVE PROGRAM
CODE SC
INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - C.S. BOWYER U OF CALIF, BERKELEY
OI - W. CASH, JR. U OF CALIF, BERKELEY
OI - F. PARESCIE U OF CALIF, BERKELEY

BRIEF DESCRIPTION
THIS INVESTIGATION IS DESIGNED TO PERFORM A FULL-SKY SURVEY, SEARCHING FOR EXTREME ULTRAVIOLET (EUV) SOURCES. THE INSTRUMENT PACKAGE CONTAINS FOUR WOLTER-SCHWARZSCHILD GRAZING INCIDENCE TELESCOPES (WITH EUV THIN-FILM FILTERS) TO COLLECT AND ISOLATE RADIATION. THE DETECTOR SYSTEM IS A RESISTOR ANODE IMAGE CONVERTOR (RANICOM) CONSISTING OF A MICROCHANNEL PLATE, A RESISTOR, AND DETECTOR AMPLIFIERS DESIGNED TO PRODUCE IMAGES OF SKY FIELDS IN SELECTED WAVELENGTH RANGES. THREE TELESCOPES ARE DESIGNED TO OPERATE AT RIGHT ANGLES TO THE SPIN AXIS AND TO CARRY OUT THE SKY SURVEY, OBSERVING IN THE WAVELENGTH RANGES 75 - 180 A, 160 - 320 A, AND 390 - 550 A. THE FOURTH TELESCOPE OPERATES AT APPROXIMATELY 10 DEG FROM THE SPIN AXIS, IN THE WAVELENGTH RANGE 150 - 350 A, AND IS DESIGNED TO OBSERVE SELECTED INTERESTING OBJECTS.

***** EXOS-C*****

SPACECRAFT COMMON NAME- EXOS-C
ALTERNATE NAMES- EXOSPHERIC SAT. C
NSSDC ID- EXOS-C

LAUNCH DATE- 00/00/82 WEIGHT- 100. KG
LAUNCH SITE- KAGOSHIMA, JAPAN
LAUNCH VEHICLE- M-4S

SPONSORING COUNTRY/AGENCY
JAPAN ISAS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 94.5 MIN INCLINATION- DEG
PERIAPSIS- 500. KM ALT APOAPSIS- 500. KM ALT

PERSONNEL
PM - M. ODA U OF TOKYO

BRIEF DESCRIPTION
THE PURPOSE OF THIS SPACECRAFT IS TO MONITOR CHARGED PARTICLES AND X-RAY, GAMMA-RAY, UV, AND IR RADIATION FROM THE SUN AND GALAXIES. THE SPACECRAFT IS PUT INTO A CIRCULAR ORBIT OF 500 KM ALTITUDE AND IS CAPABLE OF PRECISE ATTITUDE CONTROL. FIVE DETECTOR SYSTEMS ARE USED TO ATTAIN THE GOALS OF THIS MISSION -- X-RAY TELESCOPES, A GAMMA-RAY TELESCOPE, A UV TELESCOPE, AN IR TELESCOPE, AND ENERGETIC PARTICLE DETECTORS. ADDITIONAL INFORMATION HAS BEEN REQUESTED BUT NOT YET RECEIVED.

----- EXOS-C, UNKNOWN-----

INVESTIGATION NAME- X-RAY AND GAMMA-RAY ASTRONOMICAL
TELESCOPES

NSSDC ID- EXOS-C -01 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE
INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
GAMMA-RAY ASTRONOMY

PERSONNEL
PI - UNKNOWN

BRIEF DESCRIPTION
THIS EXPERIMENT OBSERVES ASTRONOMICAL SOURCES WITH X-RAY AND GAMMA-RAY TELESCOPES. ADDITIONAL INFORMATION HAS BEEN REQUESTED BUT NOT YET RECEIVED.

----- EXOS-C, UNKNOWN-----

INVESTIGATION NAME- ULTRAVIOLET TELESCOPE

NSSDC ID- EXOS-C -02 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE
INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - UNKNOWN

BRIEF DESCRIPTION
THIS EXPERIMENT IS USED TO OBSERVE ASTRONOMICAL OBJECTS IN THE UV REGION OF THE SPECTRUM. ADDITIONAL INFORMATION HAS BEEN REQUESTED BUT NOT YET RECEIVED.

----- EXOS-C, UNKNOWN-----

INVESTIGATION NAME- INFRARED TELESCOPE

NSSDC ID- EXOS-C -03 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE
INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - UNKNOWN

BRIEF DESCRIPTION
THIS EXPERIMENT IS USED TO OBSERVE ASTRONOMICAL OBJECTS IN THE INFRARED REGION OF THE SPECTRUM. ADDITIONAL INFORMATION HAS BEEN REQUESTED BUT NOT YET RECEIVED.

----- EXOS-C, UNKNOWN-----

INVESTIGATION NAME- ENERGETIC PARTICLES

NSSDC ID- EXOS-C -04 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL
PI - UNKNOWN

BRIEF DESCRIPTION
THE PURPOSE OF THIS EXPERIMENT IS TO MEASURE ENERGETIC CHARGED PARTICLES OF BOTH SOLAR AND GALACTIC ORIGIN. ADDITIONAL INFORMATION HAS BEEN REQUESTED BUT NOT YET RECEIVED.

***** EXOSAT*****

SPACECRAFT COMMON NAME- EXOSAT
ALTERNATE NAMES- HI.ECCEN LUN OCCULT.SAT., EUROPEAN X-RAY OBS S
HELOS

NSSDC ID- EXOSAT

LAUNCH DATE- 02/00/81 WEIGHT- 500. KG
LAUNCH SITE- KOUROU (CENTRE SPATIAL GUYANAIS), FRANCE
LAUNCH VEHICLE- ARIANE

ORIGINAL PAGE IS
OF POOR QUALITY

SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 5767. MIN INCLINATION- 70. DEG
PERIAPSIS- 300. KM ALT APOAPSIS- 200000. KM ALT

PERSONNEL
PM - G. ALTMANN ESA-ESTEC
PS - R.D. ANDRESEN ESA-ESTEC
PS - A. PEACOCK ESA-ESTEC

BRIEF DESCRIPTION

THE SCIENTIFIC MISSION OF THE EUROPEAN X-RAY OBSERVATORY SATELLITE (EXOSAT) IS TO MEASURE THE POSITION, STRUCTURAL FEATURES AND SPECTRAL AND TEMPORAL CHARACTERISTICS OF COSMIC X-RAY SOURCES IN THE RANGE FROM APPROXIMATELY 0.1 KEV TO 50 KEV. EXOSAT USES TWO OPERATIONAL MODES; (A) THE OCCULTATION MODE, FOR THE PRECISE DETERMINATION AND IDENTIFICATION OF SOURCES AND THE OBSERVATION OF STRUCTURAL FEATURES, USING PRIMARILY THE MOON OR THE EARTH AS THE OCCULTING BODY, AND (B) THE ARBITRARY POINTING MODE FOR THE STUDY OF THE TEMPORAL AND SPECTRAL VARIABILITY OF SOURCES OVER LONG UNINTERRUPTED TIME INTERVALS AND THE MAPPING OF LOW ENERGY SOURCES. THE OBSERVATORY, PLACED IN A HIGHLY ECCENTRIC ORBIT WITH ITS APOGEE AT 200,000 KM AND AT A HIGH LATITUDE, IS CAPABLE OF OBSERVING LUNAR OCCULTATIONS OVER 20 PERCENT OF THE CELESTIAL SPHERE WITHIN A YEAR. THE POSITIONAL ACCURACY OF BRIGHT SOURCES ($\sim 1.0E-2$ PHOTONS/SQ CM-S IN THE RANGE GREATER THAN 1.5 KEV) IS LIMITED TO ABOUT 1 ARC-S BY THE INACCURACY OF MEASUREMENT OF THE POSITION OF THE SATELLITE AND THE UNCERTAINTY OF THE TOPOGRAPHY OF THE LUNAR LIMB. FOR WEAKER SOURCES, THE ACCURACY IS LIMITED BY STATISTICS, I.E., THE TOTAL NUMBER OF X-RAY QUANTA RECEIVED DURING THE TIME OF THE CORRESPONDING ANGULAR DISPLACEMENT OF THE MOON. WHEN NOT ENGAGED IN OCCULTATION OBSERVATIONS, THE OBSERVATORY CAN VIEW THE SKY UNINTERRUPTEDLY IN ANY CHOSEN DIRECTION (EXCEPT 60 DEG ABOUT THE SOLAR DIRECTION) FOR AS LONG AS THE ORBITAL PERIOD ABOVE THE VAN ALLEN BELTS (APPROXIMATELY 80 H). WITH ACCURATE TIMEKEEPING ON BOARD, AND WITH THIS CAPABILITY OF LONG CONTINUOUS OBSERVATION, EXOSAT CAN DETERMINE REGULAR AND IRREGULAR VARIATIONS OF THE INTENSITY OF X-RAY SOURCES ON A TIME SCALE RANGING FROM TENS OF MICROSECONDS TO TENS OF HOURS. THE TRIAXIAL STABILIZED SPACECRAFT IS A CYLINDER WITH A DIAMETER OF 192 CM AND A HEIGHT OF 117 CM. A ROTATABLE SOLAR ARRAY WITH AN AREA OF 3 SQ M IS MOUNTED ON TOP OF THE SPACECRAFT. THE STAR TRACKERS ARE MOUNTED ON THE OPTICAL BENCHES OF THE TWO IMAGING TELESCOPES TO FACILITATE ALIGNMENT AND STABILITY. IN THE OCCULTATION AND ARBITRARY POINTING MODES, THE OBSERVATORY IS ABLE TO VIEW ALL OF THE CELESTIAL SPHERE EXCLUDING A CONE OF 15 AND 60 DEG HALF ANGLE CENTERED ON THE SUN, RESPECTIVELY. CONSUMABLES ARE DIMENSIONED TO ENABLE SOME 100 ORBITAL MANEUVERS FOR LUNAR OCCULTATION TO BE UNDERTAKEN AND OVER 2000 TARGETS TO BE OBSERVED. THE SCIENTIFIC PAYLOAD IS FUNDED BY ESA AND ITS DEVELOPMENT MANAGED BY ESA. USE OF THE OBSERVATORY IS OPEN TO THE SCIENTIFIC COMMUNITY FOLLOWING SELECTION OF OBSERVATIONAL PROPOSALS.

----- EXOSAT, BOYD-----

INVESTIGATION NAME- LOW-ENERGY X-RAY IMAGING TELESCOPES

NSSDC ID- EXOSAT -02 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
TL - R.L.F. BOYD U COLLEGE LONDON
TM - P.W. SANFORD U COLLEGE LONDON
TM - B.N. SWANENBURG U OF LEIDEN
TM - J.A.M. BLEEKER U OF LEIDEN
TM - C. DE JAGER U OF UTRECHT
TM - A.C. BRINKMAN U OF UTRECHT

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTS OF TWO IDENTICAL IMAGING TELESCOPES MADE BY SETS OF TWO NESTED GRAZING-INCIDENCE PARABOLIC/HYPERBOLIC REFLECTORS WITH A FOCAL-PLANE ASSEMBLY INCORPORATING A GAS-FLOW POSITION-SENSITIVE PROPORTIONAL COUNTER AND A CHANNEL-MULTIPLIER ARRAY, COVERING THE ENERGY RANGE FROM THE EUV TO 2.5 KEV, WHICH IS LIMITED BY THE REFLECTING OPTICS. AT THE EXIT PLANE OF THE MIRROR A TRANSMISSION GRATING IS LOCATED FOR SPECTROSCOPIC MEASUREMENTS.

----- EXOSAT, TAYLOR-----

INVESTIGATION NAME- GAS SCINTILLATION X-RAY SPECTROMETER

NSSDC ID- EXOSAT -03 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

TL - B.G. TAYLOR	ESA-ESTEC
TM - R.D. ANDRESEN	ESA-ESTEC
TM - R.L.F. BOYD	U COLLEGE LONDON
TM - P.W. SANFORD	U COLLEGE LONDON
TM - L. SCARSI	U OF PALERMO
TM - S. SALENI	U OF PALERMO
TM - G. BOELLA	U OF MILAN
TM - G. VILLA	U OF MILAN
OI - A. PEACOCK	ESA-ESTEC

BRIEF DESCRIPTION

A GAS SCINTILLATION PROPORTIONAL COUNTER SPECTROMETER IS USED TO STUDY DETAILED SPECTRAL FEATURES IN THE ENERGY RANGE FROM 2.5 TO 50 KEV. THE DEVICE HAS AN EFFECTIVE AREA OF 250 SQ CM AND AN ENERGY RESOLUTION OF BETTER THAN 10 PERCENT AT 6 KEV. THE COUNTER WINDOW IS A 250-MICROMETER BERYLLIUM FOIL AND THE GAS FILLING IS 70 PERCENT XE AND 30 PERCENT AR.

----- EXOSAT, TRUMPER-----

INVESTIGATION NAME- MEDIUM-ENERGY COSMIC X-RAY PACKAGE

NSSDC ID- EXOSAT -01 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

TL - J. TRUMPER	MPI-EXTRATERR PHYS
TM - H. ZIMMERMAN	MPI-EXTRATERR PHYS
TM - K.A. POUNDS	U OF LEICESTER
TM - M. TURNER	U OF LEICESTER
OI - R. STAUBERT	U OF TUBINGEN

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTS OF AN ARRAY OF ARGON-FILLED PROPORTIONAL COUNTERS BACKED UP BY XENON-FILLED COUNTERS WITH AN EFFECTIVE AREA OF 2,000 SQ CM COVERING THE ENERGY RANGE FROM 1.2 TO 50 KEV. THE ARRAY IS DIVIDED INTO FOUR SECTIONS, EACH OF WHICH CAN BE OFFSET FROM THE POINTING DIRECTION TO PROVIDE FOR A VARIABLE FLAT TOP COLLIMATOR RESPONSE. THE COLLIMATORS PROVIDE A FIELD OF VIEW OF 45 ARC MINUTES AND THE DETECTORS HAVE AN ENERGY RESOLUTION OF 20 PERCENT AT 6 KEV FOR ARGON AND AT 22 KEV FOR XENON.

***** FIREWHEEL*****

SPACECRAFT COMMON NAME- FIREWHEEL
ALTERNATE NAMES- FEUERRAD

NSSDC ID- FIRE-A

LAUNCH DATE- 03/15/80 WEIGHT- 920. KG
LAUNCH SITE- KOUROU (CENTRE SPATIAL GUYANAIS), FRANCE
LAUNCH VEHICLE- ARIANE

SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1118.4 MIN INCLINATION- 17. DEG
PERIAPSIS- 200. KM ALT APOAPSIS- 58422. KM ALT

PERSONNEL
PM - B. HAUSLER MPI-EXTRATERR PHYS
PS - G. HAERENDEL MPI-EXTRATERR PHYS

BRIEF DESCRIPTION

THIS SPACECRAFT IS DESIGNED TO MAKE BARIUM AND LITHIUM ION RELEASES IN THE NIGHT MAGNETOSPHERE AT 9.5 AND 7 RE, RESPECTIVELY, AND OVER NORTH AND SOUTH AMERICA. THE MAIN SPACECRAFT CARRIES 12 EJECTABLE ION RELEASE CONTAINERS. DIAGNOSTIC MEASUREMENTS WILL BE MADE ON THE MAIN SPACECRAFT AND ON FOUR EJECTABLE SUB-PAYLOADS. OPTICAL MEASUREMENTS WILL BE MADE FROM THE GROUND AND FROM AIRCRAFT. THE SCIENTIFIC OBJECTIVES ARE: (1) STUDY OF THE PLASMA PROCESSES CONTROLLING THE FORMATION AND DECAY OF A MAGNETIC CAVITY; (2) STUDY OF THE MOMENTUM EXCHANGE WITH THE AMBIENT DILUTE PLASMA AND OF THE LONG-RANGE MAGNETOSPHERIC PERTURBATIONS GENERATED THEREBY; (3) MODIFICATION OF THE INTERACTION OF TRAPPED ENERGETIC PARTICLES WITH SELF-GENERATED WHISTLER MODE AND ION CYCLOTRON WAVES; AND (4) TRACING OF ACCELERATION AND REDISTRIBUTION OF THE INJECTED IONS IN THE INNER MAGNETOSPHERE. THE SPACECRAFT IS BATTERY-POWERED, WITH A LIFETIME OF LESS THAN 48 HOURS.

----- FIREWHEEL, ACUNA-----

INVESTIGATION NAME- DC MAGNETOMETER

NSSDC ID- FIRE-A -02 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - M.H. ACUNA

NASA-GSFC

SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESA

BRIEF DESCRIPTION

THIS EXPERIMENT IS MOUNTED ON A 2-M BOOM AND PROVIDES THREE-AXIS MAGNETIC FIELD MEASUREMENTS, WITH A RESOLUTION OF 4. E-3 NT IN THE HIGHEST SENSITIVITY RANGE.

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC

ORBIT PERIOD- 1118.4 MIN

PERIAPSIS- 200. KM ALT

INCLINATION- 17. DEG

APOAPSIS- 58422. KM ALT

----- FIREWHEEL, FOPPL-----

INVESTIGATION NAME- ION RELEASE

NSSDC ID- FIRE-A -01

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PM - H. HEETDERKS

PS - F.S. MOZER

U OF CALIF, BERKELEY

U OF CALIF, BERKELEY

BRIEF DESCRIPTION

THIS SUB-PAYLOAD IS EJECTED FROM FIRE-A, AND CARRIES DIAGNOSTIC INSTRUMENTS FOR OBSERVATION OF THE ION RELEASES IN THE NIGHT MAGNETOSPHERE. TELEMETRY IS 4800 BPS AT 2206.5 MHZ. THE SPACECRAFT IS BATTERY-OPERATED, WITH A LIFETIME OF LESS THAN 48 HOURS.

***** FIREWHEEL SUB-PAYLOAD 3*****

SPACECRAFT COMMON NAME- FIREWHEEL SUB-PAYLOAD 3
ALTERNATE NAMES-

NSSDC ID- FIRE-D

LAUNCH DATE- 03/15/80

WEIGHT- 920. KG

LAUNCH SITE- KOUROU (CENTRE SPATIAL GUYANAIS), FRANCE

LAUNCH VEHICLE- ARIANE

SPONSORING COUNTRY/AGENCY

INTERNATIONAL ESA

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC

ORBIT PERIOD- 1118.4 MIN

PERIAPSIS- 200. KM ALT

INCLINATION- 17. DEG

APOAPSIS- 58422. KM ALT

PERSONNEL

PM - R.B. BRAUN

PS - B.A. WHALEN

SED SYSTEMS, LTD

HERZBERG INST OF ASTRO

BRIEF DESCRIPTION

THIS SUB-PAYLOAD IS EJECTED FROM FIRE-A, AND CARRIES DIAGNOSTIC INSTRUMENTS FOR OBSERVATION OF THE ION RELEASES IN THE NIGHT MAGNETOSPHERE. TELEMETRY IS 8192 BPS AT 2203.0 MHZ. THE SPACECRAFT IS BATTERY-OPERATED, WITH A LIFETIME OF LESS THAN 48 HOURS.

***** FIREWHEEL SUB-PAYLOAD 4*****

SPACECRAFT COMMON NAME- FIREWHEEL SUB-PAYLOAD 4
ALTERNATE NAMES-

NSSDC ID- FIRE-E

LAUNCH DATE- 03/15/80

WEIGHT- 920. KG

LAUNCH SITE- KOUROU (CENTRE SPATIAL GUYANAIS), FRANCE

LAUNCH VEHICLE- ARIANE

SPONSORING COUNTRY/AGENCY

INTERNATIONAL ESA

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC

ORBIT PERIOD- 1118.4 MIN

PERIAPSIS- 200. KM ALT

INCLINATION- 17. DEG

APOAPSIS- 58422. KM ALT

PERSONNEL

PM - G. PASCHMANN

PS - G. PASCHMANN

MPI-EXTRATERR PHYS

MPI-EXTRATERR PHYS

BRIEF DESCRIPTION

THIS SUB-PAYLOAD IS EJECTED FROM FIRE-A, AND CARRIES DIAGNOSTIC INSTRUMENTS FOR OBSERVATION OF THE ION RELEASES IN THE NIGHT MAGNETOSPHERE. TELEMETRY IS 6400 BPS AT 2227.0 MHZ. THE SPACECRAFT IS BATTERY-OPERATED, WITH A LIFETIME OF LESS THAN 48 HOURS.

***** GALILEO ORBITER*****

SPACECRAFT COMMON NAME- GALILEO ORBITER
ALTERNATE NAMES- JUPITER ORBITER PROBE, JOP
GALILEO

NSSDC ID- JOPO

LAUNCH DATE- 01/06/82

WEIGHT- 680. KG

LAUNCH SITE- CAPE CANAVERAL, UNITED STATES

LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY

UNITED STATES NASA-OSS

PERSONNEL

PI - H.

FOPPL

MPI-EXTRATERR PHYS

CI - A.

VALENZUELA

MPI-EXTRATERR PHYS

BRIEF DESCRIPTION

THIS EXPERIMENT IS DESIGNED TO RELEASE BARIUM AND LITHIUM CLOUDS. THE BARIUM RELEASED IS FROM A TOTAL OF EIGHT CONTAINERS, EACH FILLED WITH 20 KG OF BARIUM-COPPER OXIDE MIXTURE. THE LITHIUM IS RELEASED FROM FOUR CONTAINERS, EACH WITH 10 KG OF LITHIUM-COPPER OXIDE MIXTURE. THE BARIUM AND LITHIUM RELEASES INJECT A TOTAL OF APPROXIMATELY 1.0E26 IONS INTO THE MAGNETOSPHERE.

----- FIREWHEEL, HAUSLER-----

INVESTIGATION NAME- AC MAGNETOMETER

NSSDC ID- FIRE-A -03

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - B.

HAUSLER

MPI-EXTRATERR PHYS

BRIEF DESCRIPTION

THIS EXPERIMENT (A ONE-AXIS SEARCH COIL) MEASURES MAGNETIC FIELD FLUCTUATIONS IN THE RANGE FROM A FEW HZ UP TO APPROXIMATELY 6 KHZ. THE SENSITIVITY OF THE COIL IS APPROXIMATELY 7 MICROVOLTS/NT HZ.

***** FIREWHEEL SUB-PAYLOAD 1*****

SPACECRAFT COMMON NAME- FIREWHEEL SUB-PAYLOAD 1
ALTERNATE NAMES-

NSSDC ID- FIRE-B

LAUNCH DATE- 03/15/80

WEIGHT- 920. KG

LAUNCH SITE- KOUROU (CENTRE SPATIAL GUYANAIS), FRANCE

LAUNCH VEHICLE- ARIANE

SPONSORING COUNTRY/AGENCY

INTERNATIONAL ESA

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC

ORBIT PERIOD- 1118.4 MIN

PERIAPSIS- 200. KM ALT

INCLINATION- 17. DEG

APOAPSIS- 58422. KM ALT

PERSONNEL

PM - R.W. MASON

PS - D.A. BRYANT

APPLETON LAB

APPLETON LAB

BRIEF DESCRIPTION

THIS SUB-PAYLOAD IS EJECTED FROM FIRE-A, AND CARRIES DIAGNOSTIC INSTRUMENTS FOR OBSERVATION OF THE ION RELEASES IN THE NIGHT MAGNETOSPHERE. TELEMETRY IS 4096 BPS AT 136.26 MHZ. THE SPACECRAFT IS BATTERY-OPERATED, WITH A LIFETIME OF LESS THAN 48 HOURS.

***** FIREWHEEL SUB-PAYLOAD 2*****

SPACECRAFT COMMON NAME- FIREWHEEL SUB-PAYLOAD 2
ALTERNATE NAMES-

NSSDC ID- FIRE-C

LAUNCH DATE- 03/15/80

WEIGHT- 920. KG

LAUNCH SITE- KOUROU (CENTRE SPATIAL GUYANAIS), FRANCE

LAUNCH VEHICLE- ARIANE

PLANNED ORBIT PARAMETERS
ORBIT TYPE- JUPITER ORBITER
ORBIT PERIOD- 86000. MIN
PERIAPSIS- 425000. KM ALT

INCLINATION- 0.0 DEG
APOAPSIS- 986000. KM ALT

PERSONNEL

MG - D.R. MCCULLAR
SC - R.E. MURPHY
PM - J. CASANI
PM - W.S. SHIPLEY
PS - T.V. JOHNSON

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-JPL
NASA-JPL
NASA-JPL

BRIEF DESCRIPTION

THIS SPACECRAFT CONSISTS OF AN ORBITER AND AN ATMOSPHERIC ENTRY PROBE. IT WILL BE LAUNCHED IN JANUARY 1982, WILL RECEIVE A GRAVITY ASSIST FROM MARS, AND WILL ARRIVE AT JUPITER IN JUNE 1985. AT THIS TIME THE PROBE WILL DESCEND INTO THE JOVIAN ATMOSPHERE AND THE ORBITER WILL CONTINUE IN ORBIT AROUND JUPITER UNTIL MARCH 1987. SEVERAL ORBITER AND PROBE EXPERIMENTS WILL BE PERFORMED. THE SPACECRAFT IS A DUAL-SPIN DESIGN IN WHICH PART OF THE SPACECRAFT IS SPINNING AT THE RATE OF 5 RPM AND THE OTHER PART IS DESPUN OR NOT SPINNING. THE PROBE IS MOUNTED IN THE SPINNING SECTION. THE PROBE, WHICH HAS NO INDEPENDENT MANEUVER OR ATTITUDE CONTROL CAPABILITY, WILL BE RELEASED FROM THE ORBITER 100 DAYS PRIOR TO JUPITER ENCOUNTER, AFTER WHICH THE ORBITER EXECUTES A DEFLECTION MOVEMENT TO RAISE ITS PERIJOVE RADIUS TO SIX JUPITER RADII. FOLLOWING HIGH-SPEED ENTRY BY PARACHUTE, THE PROBE TELEMETERS STORED AND REAL-TIME DATA TO THE ORBITER, WHICH SERVES AS A RELAY LINK TO EARTH. APPROXIMATELY 45 MIN OF DATA ARE TRANSMITTED TO THE ORBITER DURING THE SUBSONIC DESCENT PHASE. THE PROBE ENTRY IS TARGETED FOR 5.5 DEG S. LATITUDE. AFTER TERMINATION OF THE PROBE MISSION THE ORBITER REORIENTS AND FIRES THE MAIN ENGINE FOR THE JUPITER ORBIT INSERTION MANEUVER. THE ORBITER USES CLOSE ENCOUNTERS WITH THE JOVIAN SATELLITES GANYMEDE AND CALLISTO TO TURN THE ORBIT INTO JUPITER'S MAGNETOTAIL. THE ORBITER POWER SOURCE IS A MODULAR 500-W SELENIDE ISOTOPE GENERATOR (SIG) THAT PROVIDES 28 V OF DC CURRENT TO ALL SUBSYSTEMS. THE TWO SIG'S (250 W EACH) ARE LOCATED ON THE SPUN PART OF THE ORBITER. TEMPERATURE IS CONTROLLED BY RADIOISOTOPE HEATER UNITS (RHU'S). TELEMETRY IS BY A TWO-CHANNEL DOWNLINK, ONE FOR CONTINUOUS TRANSMISSION OF FIXED FORMAT (6.25 BPS) ON THE S-BAND, AND THE OTHER FOR REAL-TIME PLAYBACK DATA AT RATES BETWEEN 2 AND 128 KBS ON THE X-BAND.

----- GALILEO ORBITER, ANDERSON-----

INVESTIGATION NAME- RADIO SCIENCE

NSSDC ID- JOPO -11

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY
RADIO PHYSICS
PLANETARY ATMOSPHERES
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

TL - J.D. ANDERSON
TM - V.R. ESHLEMAN
TM - F.B. ESTABROOK
TM - G. FJELDBO
TM - E. GERARD
TM - S. GULKIS
TM - A.J. KLIJORE
TM - R. WOO
TM - G.F. LINDAL

NASA-JPL
STANFORD U
NASA-JPL
NASA-JPL
PARIS OBSERVATORY
NASA-JPL
NASA-JPL
NASA-JPL
NASA-JPL

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION ARE TO: (1) INVESTIGATE THE HIGH-ALTITUDE NEUTRAL ATMOSPHERE OF JUPITER, USING OCCULTATION TECHNIQUES TO MEASURE PRESSURE, TEMPERATURE, MOLECULAR WEIGHT, AND TURBULENCE; (2) INVESTIGATE THE IONOSPHERE OF JUPITER AND ITS INTERACTION WITH THE MAGNETOSPHERE, USING OCCULTATION TECHNIQUES TO DETERMINE ELECTRON NUMBER DENSITY AND PLASMA SCALE HEIGHTS; (3) DETERMINE THE SIZES AND SHAPES OF THE GALILEAN SATELLITES; (4) SEARCH FOR AND CHARACTERIZE ATMOSPHERES AND IONOSPHERES OF THE GALILEAN SATELLITES AND STUDY THEIR INTERACTIONS WITH THE JOVIAN MAGNETOSPHERE; (5) DETERMINE THE STRUCTURE OF THE GRAVITATIONAL FIELD OF JUPITER FROM DOPPLER TRACKING; (6) DETERMINE THE MASSES AND GRAVITATIONAL MOMENTS OF THE GALILEAN SATELLITES AND IMPROVE KNOWLEDGE OF THEIR ORBITS; (7) STUDY TURBULENCE, ELECTRON DENSITY FLUCTUATIONS, AND WINDS IN THE JOVIAN IONOSPHERE; (8) INVESTIGATE MICROWAVE EMISSION FROM THE ATMOSPHERE AND TRAPPED RADIATION BELTS OF JUPITER; AND (9) SEARCH FOR VLF GRAVITATIONAL WAVES INCIDENT ON THE SOLAR SYSTEM TO A LEVEL OF STRAIN AMPLITUDE APPROXIMATELY $1.E-15$. INVESTIGATORS USE THE SIGNALS TRANSMITTED BETWEEN THE EARTH AND THE ORBITER AND BETWEEN THE PROBE AND THE ORBITER TO CARRY OUT THEIR INVESTIGATIONS. THE EARTH-ORBITER COMMUNICATIONS USE AN S-BAND (2115-MHZ) UPLINK AND TRANSPONDER TO GENERATE A COHERENT S-X BAND DOWNLINK (2297 MHZ AND 8422 MHZ), USING AN EARTH-ORIENTED 5-M DISH ANTENNA. THE FREQUENCY STABILITY IS APPROXIMATELY 1 PART IN $1.E+11$. THE PROBE-TO-ORBITER TRANSMISSION IS AT A FREQUENCY BETWEEN 1 AND 2 GHZ, USING A WIDE-BAND RECEIVER AND BODY-FIXED 1-M DISH ANTENNA. FOLLOWING THE PROBE MISSION THIS RECEIVER AND ANTENNA ARE AVAILABLE TO CARRY OUT ADDITIONAL INVESTIGATIONS. INDIVIDUAL INVESTIGATORS AND THEIR INVESTIGATIONS ARE LISTED IN APPENDIX B.

----- GALILEO ORBITER, BELTON-----

INVESTIGATION NAME- ORBITER IMAGING

NSSDC ID- JOPO -10

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY
PLANETARY ATMOSPHERES

PERSONNEL

TL - M.J.S. BELTON
TM - C.D. ANGER
TM - C.R. CHAPMAN
TM - M.E. DAVIES
TM - R. GREELEY
TM - R. GREENBERG
TM - J.W. HEAD, 3RD
TM - G. NEUKUM
TM - G. SCHUBERT
TM - C.B. PILCHER
TM - J. VEVERKA
TM - M.H. CARR
TM - J.B. WELLMAN

KITT PEAK NATL OBS
U OF CALGARY
PLANETARY SCIENCE INST
RAND CORP
ARIZONA STATE U
PLANETARY SCIENCE INST
BROWN U
MPI-NUCLEAR PHYS
U OF CALIF, LA
U OF HAWAII
CORNELL U
US GEOLOGICAL SURVEY
NASA-JPL

BRIEF DESCRIPTION

THE PURPOSE OF THIS INVESTIGATION IS TO STUDY JUPITER AND ITS SATELLITES THROUGH MULTI-SPECTRAL, HIGH-RESOLUTION IMAGING WITH A CCD CAMERA. SPECIFIC SCIENCE OBJECTIVES ARE TO: (1) INVESTIGATE THE STRUCTURE OF THE JOVIAN ATMOSPHERE AND CLOUDS THROUGH MULTI-SPECTRAL PHOTOMETRY AND POLARIMETRY; (2) INVESTIGATE THE DYNAMICS OF THE JOVIAN ATMOSPHERE THROUGH SYNOPTIC IMAGING OF CLOUD STRUCTURES; (3) MEASURE THE SIZES AND SHAPES OF THE GALILEAN SATELLITES AND DETERMINE THEIR LIBRATIONS; (4) MAP THE SURFACE MORPHOLOGY OF THE GALILEAN SATELLITES AT SPATIAL RESOLUTION BETTER THAN 1 KM AND OVER A RANGE OF VIEWING AND LIGHTING ANGLES IN ORDER TO INVESTIGATE THE GEOLOGICAL PROCESSES THAT HAVE ACTED ON THEIR SURFACES; (5) USE MULTISPECTRAL IMAGING TO IDENTIFY AND MAP THE DISTRIBUTION OF ICES AND MINERALS ON THE SURFACES OF THE SATELLITES; (6) SEARCH FOR AURORAL OR OTHER ATMOSPHERIC EMISSION ON THE NIGHT SIDE OF JUPITER, ON THE SATELLITES, AND IN CIRCUM-JOVIAN SPACE; AND (7) SEEK TARGETS OF OPPORTUNITY FOR IMAGING THE IRREGULAR SATELLITES OF JUPITER. THE IMAGING INVESTIGATION USES A SINGLE CAMERA CONSISTING OF A 1500-NANOMETER FOCAL LENGTH CATADIOPTRIC TELESCOPE IMAGING ONTO AN 800 X 800 ELEMENT CHARGE-COUPLED DEVICE (CCD). OPTICS ARE FUSED SILICON. AN EIGHT-POSITION FILTER WHEEL (FILTERS NOT SPECIFIED) IS USED. THE SPECTRAL RESPONSE IS 350 TO 1100 NANOMETERS, RESOLUTION IS 20 MICRORAD PER LINE PAIR, THE FIELD OF VIEW IS 0.008 RAD (0.46 DEG), THE MINIMUM EXPOSURE IS 5 MILLISECONDS, AND THE MAXIMUM FRAME RATE IS ABOUT 1/MIN. THE LINEAR DYNAMIC RANGE EXCEEDS 1000, WITH 8 BIT/PIXEL ENCODING. THE INSTRUMENT IS MOUNTED ON THE SCAN PLATFORM OF THE ORBITER. THE TOTAL MASS IS 23 KG AND THE TOTAL CONTINUOUS POWER IS 23 W. INDIVIDUAL INVESTIGATORS AND THEIR INVESTIGATIONS ARE LISTED IN APPENDIX B.

----- GALILEO ORBITER, CARLSON-----

INVESTIGATION NAME- NEAR INFRARED MAPPING SPECTROMETER
(NIMS) INVESTIGATION AND MAPPER

NSSDC ID- JOPO -01

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
GEODESY AND CARTOGRAPHY

PERSONNEL

PI - R.W. CARLSON
OI - T.V. JOHNSON
OI - G.E. DANIELSON
OI - F.P. FANALE
OI - H.H. KIEFFER
OI - J.S. LEWIS
OI - H. MASURSKY
OI - D.L. MATSON
OI - T.B. MCCORD
OI - L.A. SODERBLOM
OI - F. TAYLOR

U OF SOUTHERN CALIF
NASA-JPL
NASA-JPL
NASA-JPL
US GEOLOGICAL SURVEY
MASS INST OF TECH
US GEOLOGICAL SURVEY
NASA-JPL
U OF HAWAII
US GEOLOGICAL SURVEY
NASA-JPL

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION ARE TO: (1) MAP THE MINERAL DISTRIBUTION ON THE SURFACES OF THE SATELLITES OF JUPITER AT A SPATIAL RESOLUTION OF 5 TO 30 KM, (2) IDENTIFY THE INDIVIDUAL PHASES AND MIXTURES PRESENT, (3) RELATE THE MINERALOGICAL PROVINCES TO GEOLOGICAL PROVINCES OBSERVED WITH THE IMAGING SYSTEM, AND (4) MAP REGIONS OF THE JOVIAN ATMOSPHERE OVER A WIDE RANGE OF PHASE ANGLES TO DETERMINE CLOUD MORPHOLOGY AND VERTICAL STRUCTURE. THE INSTRUMENT IS A HIGH-SPEED SCANNING REFLECTION GRATING SPECTROMETER MOUNTED ON THE SCAN PLATFORM OF THE ORBITER. IMAGING IS DONE BY A 20-CM APERTURE TELESCOPE ONTO AN INSB DETECTOR ARRAY IN ORDER TO PRODUCE MULTI-SPECTRAL LINE IMAGES OF SOURCES WITHOUT EXTERNAL SCANNING. ANGULAR RESOLUTION IS 0.5 MILLIRAD AND THE SPECTRAL RANGE IS 0.9 TO 3.0 MICROMETERS IN 144 CHANNELS AT A SPECTRAL RESOLUTION OF 0.03 MICROMETERS. THE TOTAL MASS OF THE SPECTROMETER IS 11 KG AND THE TOTAL POWER IS 8 W.

----- GALILEO ORBITER, FANALE-----

INVESTIGATION NAME- FORMATION AND EVOLUTION OF THE GALILEAN SATELLITES

NSSDC ID- JOPO -12 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY

PERSONNEL
PI - F.P. FANALE NASA-JPL

BRIEF DESCRIPTION

THIS INVESTIGATION UTILIZES GALILEO ORBITER REMOTE SENSING DATA, PRIMARILY FROM THE IMAGING, NIMS, AND UVS INVESTIGATIONS, TO STUDY THE FORMATIONAL CONDITIONS AND SUBSEQUENT GEOLOGICAL EVOLUTION OF THE GALILEAN SATELLITES, INCLUDING THE INTERACTION OF THESE BODIES WITH THEIR SPACE ENVIRONMENTS.

----- GALILEO ORBITER, FRANK-----

INVESTIGATION NAME- PLASMA

NSSDC ID- JOPO -04 INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - L.A. FRANK U OF IOWA
OI - F.V. CORONITI U OF CALIF, LA
OI - V.M. VASYLIUNAS MPI-AERONOMY

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION ARE TO: ESTABLISH THE SOURCES OF JOVIAN PLASMA; INVESTIGATE PLASMA INTERACTIONS WITH THE JOVIAN SATELLITES; INVESTIGATE THE ROLE OF PLASMA AS A SOURCE FOR ENERGETIC CHARGED PARTICLES IN THE RADIATION ZONES; DETERMINE THE NATURE OF THE EQUATORIAL CURRENT SHEET; AND EVALUATE THE ROLES OF MAGNETIC MERGING, CO-ROTATIONAL FORCES AND FIELD-ALIGNED CURRENTS IN THE DYNAMICS OF THE JOVIAN MAGNETOSPHERE. THE INVESTIGATION USES AN ELECTROSTATIC ANALYZER (QUADRISPHERICAL LEPEDEA) IN DETERMINING DIFFERENTIAL ENERGY SPECTRA OF BOTH POSITIVE IONS AND ELECTRONS WITH ESSENTIALLY COMPLETE ANGULAR COVERAGE IN 63 CONTIGUOUS PASSBANDS. THE FRACTIONAL ENERGY RESOLUTION IS 0.17 AND THE RANGE IS 1 EV TO 50 KEV. THREE MINIATURE MASS SPECTROMETERS AT THE ANALYZER EXIT APERTURE ARE USED FOR MASS ANALYSIS, WITH A FRACTIONAL MASS RESOLUTION OF 0.18, SUFFICIENT TO IDENTIFY H⁺, HE⁺, HE²⁺, NA⁺, K⁺, AND S⁺. THE ANALYZER IS MOUNTED ON A SHORT BOOM ON THE SPINNING SECTION OF THE ORBITER. THE TOTAL MASS (EXCLUDING THE BOOM) IS 6.9 KG, AND THE TOTAL POWER IS 7.2 W.

----- GALILEO ORBITER, GIERASCH-----

INVESTIGATION NAME- JOVIAN ATMOSPHERIC DYNAMICS

NSSDC ID- JOPO -13 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL
PI - P.J. GIERASCH CORNELL U

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO UTILIZE DATA FROM THE IMAGING AND NIMS INVESTIGATIONS ON THE ORBITER, TOGETHER WITH IN SITU ATMOSPHERE DATA FROM THE PROBE, TO STUDY DYNAMICS OF THE ATMOSPHERE WITH PARTICULAR EMPHASIS ON THE NATURE AND CAUSE OF THE HORIZONTAL TEMPERATURE GRADIENTS BENEATH THE CLOUDS.

----- GALILEO ORBITER, GRARD-----

INVESTIGATION NAME- ELECTRON EMITTER

NSSDC ID- JOPO -05 INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS

PERSONNEL
PI - R.J.L. GRARD ESA-ESTEC
OI - S.E. DEFOREST U OF CALIF, SAN DIEGO
OI - R.M. GOLDSTEIN NASA-JPL
OI - A. GONFALONE ESA-ESTEC
OI - D. JONES ESA-ESTEC
OI - K. KNOTT ESA-ESTEC
OI - A. PEDERSEN ESA-ESTEC

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO CLAMP THE POTENTIAL OF THE SPACECRAFT TO THAT OF THE SURROUNDING PLASMA AND MEASURE ELECTRON SATURATION CURRENT COLLECTED BY THE SPACECRAFT, AND TO INVESTIGATE THE LOW ENERGY ELECTRON DENSITY AND TEMPERATURE, THE FLOATING POTENTIAL OF THE SPACECRAFT, AND THE CONDUCTION CURRENT OF ELECTROMAGNETIC AND ELECTROSTATIC WAVES UP TO THE LOCAL PLASMA FREQUENCY. THREE INDIRECTLY HEATED CATHODES WITH APPROPRIATE ELECTRONICS ARE MOUNTED ON THE DESPUN SECTION OF THE ORBITER, WITH CATHODES ON A SHORT (90-CM) BOOM. THE TOTAL MASS (EXCLUDING THE BOOM) IS 1.0 KG AND THE TOTAL POWER IS 2.9 W.

----- GALILEO ORBITER, GRUN-----

INVESTIGATION NAME- DUST

NSSDC ID- JOPO -09 INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST
PARTICLES AND FIELDS

PERSONNEL
PI - E. GRUN MPI-NUCLEAR PHYS
OI - H. FECHTIG MPI-NUCLEAR PHYS
OI - J. KISSEL MPI-NUCLEAR PHYS
OI - B.A. LINDBLAD LUND OBS
OI - G. MORFILL MPI-NUCLEAR PHYS
OI - H.A. ZOOK NASA-JSC

BRIEF DESCRIPTION

THE PURPOSE OF THIS INVESTIGATION IS TO DETERMINE THE PHYSICAL AND DYNAMICAL PROPERTIES OF SMALL DUST PARTICLES IN THE JOVIAN ENVIRONMENT, WITH EMPHASIS ON THE INTERACTION OF DUST WITH THE MAGNETOSPHERE AND SATELLITE SURFACES. PARAMETERS MEASURED INCLUDE MASS, DIRECTION OF MOTION, AND CHARGE. THE INSTRUMENT PACKAGE CONSISTS OF ENTRANCE GRIDS FOR SENSING CHARGE, AN IMPACT PLASMA DETECTOR TO MEASURE PULSE HEIGHT AND RISE TIME FOR BOTH ELECTRONS AND IONS GENERATED BY IMPACT, AND APPROPRIATE ELECTRONICS. MASS AND VELOCITY ARE DERIVED FROM MEASUREMENTS BY EMPIRICAL RELATIONSHIPS DETERMINED IN GROUND-BASED CALIBRATIONS. THE IMPACT RATE RANGE IS 1.E-7 TO 1.E+2 PER SECOND, THE PARTICLE MASS RANGE IS 1.E-16 TO 1.E-6 G, AND THE CHARGE RANGE IS 1.E-14 TO 1.E-10 C. THE INSTRUMENT PACKAGE IS MOUNTED ON THE SPINNING SECTION OF THE ORBITER. ITS TOTAL MASS IS 4.2 KG, AND THE TOTAL POWER IS 1.7 W.

----- GALILEO ORBITER, GURNETT-----

INVESTIGATION NAME- PLASMA WAVE SPECTROMETER

NSSDC ID- JOPO -07 INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - D.A. GURNETT U OF IOWA
OI - R.E. GENDRIN CNET
OI - C.F. KENNEL U OF CALIF, LA
OI - F.L. SCARF TRW SYSTEMS GROUP
OI - S.D. SHAWHAN U OF IOWA

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION ARE TO MEASURE THE VARYING ELECTRIC AND MAGNETIC FIELDS IN THE JOVIAN PLASMA IN ORDER TO DETERMINE THE CHARACTERISTICS AND ORIGIN OF PLASMA WAVES IN THE MAGNETOSPHERE AND TO ANALYZE VARIOUS WAVE-PARTICLE INTERACTION PHENOMENA IN THE MAGNETOSPHERE INTERACTIONS. THE INSTRUMENT PACKAGE INCLUDES A 2-M ELECTRIC DIPOLE ANTENNA FOR ELECTRIC FIELD MEASUREMENT AND TWO 27-CM SEARCH COIL MAGNETOMETERS, ONE FOR LOW FREQUENCY (LESS THAN 10 KHZ) AND THE OTHER FOR HIGH FREQUENCY MAGNETIC FIELD MEASUREMENTS. THERE IS ALSO A 20-CHANNEL SPECTRUM ANALYZER COVERING THE RANGE 5.6 HZ TO 311 KHZ, WITH 4 CHANNELS PER DECADE AND A HIGH DATA RATE WAVEFORM RECEIVER TO BE USED DURING SELECTED PERIODS. SENSORS ARE MOUNTED AS A SINGLE UNIT IN A BOOM APPROXIMATELY 2-M LONG ON THE SPINNING SECTION OF THE ORBITER. ELECTRONICS ARE MOUNTED NEAR THE BASE OF THE BOOM. THE TOTAL MASS OF THE PACKAGE IS 3.1 KG (1.2 KG FOR THE SENSORS AND 1.9 KG FOR ELECTRONICS). THE TOTAL POWER IS 2.8 W.

----- GALILEO ORBITER, HORD-----

INVESTIGATION NAME- ULTRAVIOLET SPECTROMETER (UVS)

NSSDC ID- JOPO -02 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES

PERSONNEL

PI - C.W. HORD U OF COLORADO
 OI - C.A. BARTH U OF COLORADO
 OI - K.K. KELLY U OF COLORADO
 OI - A.L. LANE NASA-JPL
 OI - A.I. STEWART U OF COLORADO
 OI - G.E. THOMAS U OF COLORADO

BRIEF DESCRIPTION

THIS INVESTIGATION STUDIES THE COMPOSITION AND STRUCTURE OF THE HIGH NEUTRAL ATMOSPHERES OF JUPITER AND THE GALILEAN SATELLITES TO DETERMINE ATMOSPHERIC LOSS RATES FROM SATELLITES, STUDY MIXING RATIOS ON JUPITER OF NH₃ AND OF UV-ACTIVE TRACE CONSTITUENTS, AND INVESTIGATE AURORAL EMISSIONS AND INTERACTIONS BETWEEN ATMOSPHERES AND THE JOVIAN PLASMASPHERE. INSTRUMENTATION CONSISTS OF A FASTIE-EBERT UV SPECTROMETER (WAVELENGTH RANGE OF 110 TO 430 NANOMETERS) WITH A CASSEGRAIN TELESCOPE HAVING A 5-CM APERTURE, 25-CM FOCAL LENGTH, AND A PROGRAMMABLE GRATING. THE SPECTRUM IS MEASURED WITH MICROCHANNEL DETECTORS AT A FOV RESOLUTION OF 1 NAUTICAL MILE AT PERIAPSIS. THE SPECTROMETER IS MOUNTED ON THE ORBITER SCAN PLATFORM AND HAS A TOTAL MASS OF 3.4 KG. THE TOTAL POWER IS 4.2 W.

----- GALILEO ORBITER, HUNTEN-----

INVESTIGATION NAME- STRUCTURE AND AERONOMY OF THE
 ATMOSPHERES OF JUPITER AND ITS SATELLITES

NSSDC ID- JOPO -14 INVESTIGATIVE PROGRAM
 CODE SL
 INVESTIGATION DISCIPLINE(S)
 PLANETARY ATMOSPHERES

PERSONNEL

PI - D.M. HUNTEN U OF ARIZONA

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO STUDY THE HEAT BALANCE OF JUPITER'S ATMOSPHERE, TO ESTIMATE THE EDDY DIFFUSION COEFFICIENTS IN THE ATMOSPHERE, AND TO STUDY THE AERONOMY OF NEUTRAL AND IONIZED ATMOSPHERES (INCLUDING THOSE OF THE SATELLITES) BY USING DATA FROM A WIDE VARIETY OF PROBE AND ORBITER INSTRUMENTS.

----- GALILEO ORBITER, KIVELSON-----

INVESTIGATION NAME- MAGNETOMETER

NSSDC ID- JOPO -03 INVESTIGATIVE PROGRAM
 CODE SL
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 PLANETOLOGY
 MAGNETOSPHERIC PHYSICS
 IONOSPHERES

PERSONNEL

PI - M.G. KIVELSON U OF CALIF, LA
 OI - P.J. COLEMAN, JR. U OF CALIF, LA
 OI - C.F. KENNEL U OF CALIF, LA
 OI - R.L. MCPHERRON U OF CALIF, LA
 OI - C.T. RUSSELL U OF CALIF, LA

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION ARE TO STUDY THE JOVIAN MAGNETIC FIELD IN ORDER TO MAP THE CONFIGURATION OF THE MAGNETOSPHERE AND ANALYZE ITS DYNAMICS, INVESTIGATE MAGNETOSPHERIC-IONOSPHERIC COUPLING, MEASURE MAGNETIC FLUCTUATIONS, SEARCH FOR MAGNETIC FIELDS ON THE SATELLITES, AND INVESTIGATE THE PROPERTIES OF THE SATELLITES AND THEIR INTERACTIONS WITH THE AMBIENT MEDIUM. THE INSTRUMENT PACKAGE INCLUDES DUAL TRIAXIAL FLUXGATE MAGNETOMETERS WITH A DYNAMIC RANGE OF 2.5.E-12 TO 1.6.E-5 TESLAS (0.0025 TO 1.6.E4 GAMMAS) MOUNTED ON A BOOM ON THE SPINNING PART OF THE ORBITER SPACECRAFT. EACH SENSOR TRIAD CAN BE MECHANICALLY FLIPPED ABOUT THE BOOM AXIS. OUTBOUND SENSORS ARE WOUND FOR LOW FIELD READINGS OF 1.E-12 TO 5.12.E-7 TESLAS (1 MILLIGAMMA - 512 GAMMAS), INBOUND SENSORS FOR HIGH FIELD READINGS OF 3.1.E-11 TO 1.6.E-5 TESLAS (31 MILLIGAMMAS - 16 KILOGAMMAS). ELECTRONICS ARE MOUNTED ON THE SPINNING SECTION AND INCLUDE OPTIMUM AVERAGING CAPABILITY. THE MASS, EXCLUDING THE BOOM, IS 3.2 KG (1.0 FOR THE SENSORS, 2.2 FOR THE ELECTRONICS). THE TOTAL POWER IS 3.7 W.

----- GALILEO ORBITER, LACIS-----

INVESTIGATION NAME- PHOTOPOLARIMETER RADIOMETER

NSSDC ID- JOPO -08 INVESTIGATIVE PROGRAM
 CODE SL
 INVESTIGATION DISCIPLINE(S)
 PLANETOLOGY
 PLANETARY ATMOSPHERES

PERSONNEL

PI - A.A. LACIS NASA-GISS
 OI - D.L. COFFEEEN NASA-GISS
 OI - J.E. HANSEN NASA-GISS
 OI - P.H. STONE MASS INST OF TECH
 OI - L. TRAVIS NASA-GISS
 OI - W.-C. WANG NASA-GISS
 OI - Y.-L. YUNG HARVARD U

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION (PPR) ARE TO DETERMINE THE CLOUD AND HAZE PROPERTIES (VERTICAL AND HORIZONTAL DISTRIBUTION AND MICROSTRUCTURE) AND RADIATION BUDGET (INCLUDING VERTICAL PROFILE OF SOLAR HEATING) OF JUPITER AND TO INVESTIGATE THE PHOTOMETRIC AND THERMAL PROPERTIES OF SATELLITE SURFACES. THE INSTRUMENT IS A 10-CM DALL-KIRKHAM TELESCOPE FOLLOWED BY A 16-POSITION FILTER WHEEL, GIVING POLARIMETRY IN 3 SPECTRAL BANDS FROM 410 TO 1050 NANOMETERS AND PHOTOMETRY IN 7 SPECTRAL BANDS FROM 560 TO 890 NANOMETERS. SILICON PHOTODIODES ARE USED FOR PHOTOPOLARIMETRY AND A THERMOPILE DETECTOR FOR RADIOMETRY. MEASUREMENT ACCURACY IS 0.1 PERCENT ABSOLUTE POLARIMETRY; 1 PERCENT RELATIVE PHOTOMETRY AND 3 PERCENT ABSOLUTE PHOTOMETRY; 1 PERCENT RELATIVE RADIOMETRY AND 5 PERCENT ABSOLUTE RADIOMETRY. THE INSTRUMENT IS MOUNTED ON THE ORBITER SCAN PLATFORM. THE TOTAL MASS IS 3.6 KG AND THE TOTAL POWER IS 7.5 W.

----- GALILEO ORBITER, MASURSKY-----

INVESTIGATION NAME- GEOLOGY OF THE GALILEAN SATELLITES

NSSDC ID- JOPO -15 INVESTIGATIVE PROGRAM
 CODE SL
 INVESTIGATION DISCIPLINE(S)
 PLANETOLOGY

PERSONNEL

PI - H. MASURSKY US GEOLOGICAL SURVEY

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO USE ORBITER IMAGING AND NIMS DATA TO INVESTIGATE GEOLOGICAL PROCESSES ON THE GALILEAN SATELLITES, WITH EMPHASIS ON THE IDENTIFICATION AND DISTRIBUTION OF SURFACE MATERIALS, THE MORPHOLOGIES AND DENSITIES OF IMPACT CRATERS, AND THE SEARCH FOR STRUCTURE INDICATIVE OF GLACIAL AND PERIGLACIAL PROCESSES.

----- GALILEO ORBITER, MCELROY-----

INVESTIGATION NAME- INVESTIGATION OF THE JOVIAN UPPER
 ATMOSPHERE AND OF SATELLITE ATMOSPHERES

NSSDC ID- JOPO -16 INVESTIGATIVE PROGRAM
 CODE SL
 INVESTIGATION DISCIPLINE(S)
 PLANETARY ATMOSPHERES

PERSONNEL

PI - M.B. MCELROY HARVARD U

BRIEF DESCRIPTION

THIS INVESTIGATION USES DATA FROM A VARIETY OF PROBE AND ORBITER INVESTIGATIONS TO STUDY THE COMPOSITION AND STRUCTURE OF PLANETARY AND SATELLITE ATMOSPHERES, WITH EMPHASIS ON PHOTOCHEMISTRY AND INTERACTION OF THE ATMOSPHERES WITH THE MAGNETOSPHERE.

----- GALILEO ORBITER, ORTON-----

INVESTIGATION NAME- GROUND-TRUTH ANALYSIS OF RADIATIVE
 TRANSFER IN THE ATMOSPHERE OF JUPITER

NSSDC ID- JOPO -17 INVESTIGATIVE PROGRAM
 CODE SL
 INVESTIGATION DISCIPLINE(S)
 PLANETARY ATMOSPHERES

PERSONNEL

PI - G.S. ORTON NASA-JPL

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO STUDY THE STRUCTURE OF THE ATMOSPHERE OF JUPITER USING DATA FROM THE PROBE STRUCTURE, COMPOSITION, NEPHELOMETER, AND NET-FLUX RADIOMETER INVESTIGATIONS, TOGETHER WITH ORBITER PHOTOPOLARIMETER/RADIOMETER AND NIMS REMOTE SENSING DATA. RESULTS INCLUDE AN ANALYSIS OF RADIATIVE EQUILIBRIUM IN THE UPPER TROPOSPHERE AND STRATOSPHERE AND AN ASSESSMENT OF THE INFORMATION REQUIRED IN GENERAL FOR SUCCESSFUL REMOTE RECOVERY OF ATMOSPHERIC CONDITIONS ON THE OUTER PLANETS.

----- GALILEO ORBITER, OWEN-----

INVESTIGATION NAME- COMPOSITION OF THE JOVIAN ATMOSPHERE

NSSDC ID- JOPO -18

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL
PI - T. OWEN

STATE U OF NEW YORK

BRIEF DESCRIPTION

THIS INVESTIGATION IS BASED ON DATA FROM THE MASS SPECTROMETER AND HELIUM INTERFEROMETER INVESTIGATIONS AND THE NIMS AND OTHER ORBITER INVESTIGATIONS TO ESTABLISH A DIRECT CALIBRATION OF PREVIOUS REMOTE MEASUREMENTS OF THE COMPOSITION OF JUPITER BY VOYAGER IRIS AND EARTH-BASED SPECTROSCOPIC OBSERVATIONS.

----- GALILEO ORBITER, POLLACK-----

INVESTIGATION NAME- THERMAL AND DYNAMICAL PROPERTIES OF THE JOVIAN ATMOSPHERE

NSSDC ID- JOPO -19

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL
PI - J.B. POLLACK

NASA-ARC

BRIEF DESCRIPTION

THE PURPOSE OF THIS INVESTIGATION IS TO DETERMINE THE VERTICAL TEMPERATURE STRUCTURE AND DYNAMICS OF THE JOVIAN ATMOSPHERE USING DATA FROM ALL OF THE PROBE INVESTIGATIONS TO CHARACTERIZE THE ROLES OF RADIATIVE HEATING, THERMAL CONVECTION, LATENT HEAT RELEASE, AND THE INTERNAL ENERGY SOURCE.

----- GALILEO ORBITER, RUSSELL-----

INVESTIGATION NAME- JUPITER MAGNETOSPHERE AND SATELLITE MAGNETOSPHERE INTERACTIONS

NSSDC ID- JOPO -20

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS
INTERPLANETARY PHYSICS

PERSONNEL
PI - C.T. RUSSELL

U OF CALIF, LA

BRIEF DESCRIPTION

THIS INVESTIGATION USES DATA FROM THE ORBITER MAGNETOMETER, PLASMA, PLASMA WAVE, AND ENERGETIC PARTICLES INVESTIGATIONS TO: (1) STUDY THE JOVIAN MAGNETOSPHERE AND SATELLITE-MAGNETOSPHERE INTERACTIONS (WITH EMPHASIS ON REFINING MODELS OF THE JOVIAN MAIN FIELD); (2) STUDY THE INTERNAL STRUCTURE OF THE GALILEAN SATELLITES FROM THEIR INTERACTIONS WITH THE AMBIENT MEDIUM; (3) INVESTIGATE THE DYNAMICS OF THE MAGNETOSPHERE; AND (4) EXAMINE CRITICALLY THE OBSERVATIONAL DATA PERTAINING TO ENERGETIC PARTICLE TRANSPORT, ACCELERATION, AND LOSS IN THE JOVIAN MAGNETOSPHERE.

----- GALILEO ORBITER, SAGAN-----

INVESTIGATION NAME- ORGANIC CHEMISTRY OF THE JOVIAN ATMOSPHERE

NSSDC ID- JOPO -21

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL
PI - C. SAGAN

CORNELL U

BRIEF DESCRIPTION

THIS INVESTIGATION USES DATA FROM THE ORBITER NIMS AND UVS INVESTIGATIONS, TOGETHER WITH THE PROBE COMPOSITION AND NEPHELOMETER INVESTIGATIONS, TO STUDY THE ORGANIC CHEMISTRY OF THE JOVIAN ATMOSPHERE, WITH EMPHASIS ON THE NATURE OF THE ORGANIC AND INORGANIC CHROMOPHORES THAT PRODUCE THE COLORS OF THE JOVIAN CLOUDS.

----- GALILEO ORBITER, SCARF-----

INVESTIGATION NAME- WAVE-PARTICLE INTERACTION PHENOMENA AT JUPITER

NSSDC ID- JOPO -22

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - F.L. SCARF

TRW SYSTEMS GROUP

BRIEF DESCRIPTION

THIS INVESTIGATION USES MAGNETOSPHERIC DATA FROM THE ORBITER PLASMA, PLASMA WAVE, AND ENERGETIC PARTICLE INVESTIGATIONS TO STUDY WAVE-PARTICLE INTERACTION PHENOMENA, WITH EMPHASIS ON EVALUATING THE EFFECTIVE TRANSPORT COEFFICIENTS (ANOMALOUS CONDUCTIVITY, PITCH-ANGLE DIFFUSION COEFFICIENT, ETC.) ASSOCIATED WITH THE MAGNETOSPHERIC PLASMA INSTABILITIES AND SATELLITE-MAGNETOSPHERE INTERACTIONS.

----- GALILEO ORBITER, SCHUBERT-----

INVESTIGATION NAME- JOVIAN ATMOSPHERIC STRUCTURE AND CIRCULATION

NSSDC ID- JOPO -23

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL
PI - G. SCHUBERT

U OF CALIF, LA

BRIEF DESCRIPTION

THIS INVESTIGATION USES DATA FROM THE ORBITER IMAGING INVESTIGATION AND FROM ALL OF THE PROBE INVESTIGATIONS TO STUDY THE THERMAL AND DYNAMICAL PROCESSES RESPONSIBLE FOR THE GLOBAL ATMOSPHERIC CIRCULATION OF JUPITER AND THE WAYS THAT THESE PROCESSES ARE INFLUENCED BY THE STRUCTURE OF THE CLOUD LAYERS.

----- GALILEO ORBITER, SONETT-----

INVESTIGATION NAME- INTERACTION OF GALILEAN SATELLITE MAGNETIC PROPERTIES+JOVIAN MAGNETOSPHERE

NSSDC ID- JOPO -24

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS
INTERPLANETARY PHYSICS

PERSONNEL
PI - C.P. SONETT

U OF ARIZONA

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION ARE TO USE DATA FROM THE ORBITER MAGNETOMETER, PLASMA, AND PLASMA WAVE INVESTIGATIONS TO MEASURE ANY INTRINSIC MAGNETIC FIELDS THAT MAY EXIST ON THE GALILEAN SATELLITES AND TO INVESTIGATE THE PROCESSES WHEREBY THESE SATELLITES INTERACT WITH THE MAGNETOSPHERE AND MAIN FIELD OF JUPITER, INCLUDING COMPARISONS TO SIMILAR INTERACTIONS INVOLVING THE MOON.

----- GALILEO ORBITER, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC PARTICLES

NSSDC ID- JOPO -06

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - D.J. WILLIAMS
OI - T.P. ARMSTRONG
OI - T.A. FRITZ
OI - S.M. KRIMIGIS
OI - L.J. LANZEROTTI
OI - R.W. MCENTIRE
OI - J.G. ROEDERER
OI - E.C. ROELOF
OI - W. STUEDEMANN
OI - B. WILKEN

NOAA-ERL
U OF KANSAS
NOAA-ERL
APPLIED PHYSICS LAB
BELL TELEPHONE LAB
APPLIED PHYSICS LAB
U OF ALASKA
APPLIED PHYSICS LAB
MPI-AERONOMY
MPI-AERONOMY

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION ARE TO: STUDY THE DETAILED ENERGY AND ANGULAR DISTRIBUTION AND STABILITY OF TRAPPED PROTONS, ELECTRONS, AND IONS AND DETERMINE ION COMPOSITION; INVESTIGATE THE INTERACTIONS OF THESE PARTICLES WITH THE SATELLITES AND THE SOLAR WIND; MEASURE THERMAL PLASMA FLOW VELOCITIES AND TEMPERATURES; AND INVESTIGATE ADIABATIC AND NONTHERMAL PROCESSES IN THE TRAPPED RADIATION. THE INSTRUMENT PACKAGE CONSISTS OF A LOW-ENERGY MAGNETOSPHERIC MEASUREMENT SYSTEM (LEMMS), A COMPOSITION MEASUREMENT SYSTEM (CMS), AND AN INSTRUMENT STEPPING PLATFORM. THE LEMMS ENERGY RANGE AND CHARGE RESPONSE (MAGNETIC DEFLECTION AND DE/DX, E TECHNIQUES) ARE, FOR ELECTRONS, 0.015 - 11 MEV, AND 0.02 - 55 MEV/ NUCLEON FOR PROTONS AND IONS. THE CMS ENERGY RANGE AND CHARGE RESPONSE (DE/DX, E, TIME OF FLIGHT, AND PULSE HEIGHT ANALYSIS TECHNIQUES) MEASURES HE THROUGH FE WITH VARYING ENERGY RESPONSES IN THE 0.15 - 100 MEV/NUCLEON RANGE. THE INSTRUMENT PACKAGE IS MOUNTED ON THE SPINNING SECTION OF THE ORBITER. THE TOTAL MASS IS 7.4 KG AND THE TOTAL POWER IS 7.4 W.

***** GALILEO PROBE*****

SPACECRAFT COMMON NAME- GALILEO PROBE
ALTERNATE NAMES- JUPITER ORBITER PROBE, JOP
GALILEO

NSSDC ID- JOP

LAUNCH DATE- 01/06/82 WEIGHT- 250. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- JUPITER PROBE

PERSONNEL

MG - D.R. MCCOLLAR	NASA HEADQUARTERS
SC - R.E. MURPHY	NASA HEADQUARTERS
PM - J. CASANI	NASA-JPL
PM - J. SPERANS	NASA-ARC
PS - L. COLIH	NASA-ARC
PS - T. JOHNSON	NASA-JPL

BRIEF DESCRIPTION

THE PROBE IS A STAGED-VENTED SYSTEM COMPRISED OF A DECELERATION MODULE AND A DESCENT MODULE. ITS MASS AND DIAMETER ARE 250 KG AND 1.2 M, RESPECTIVELY. THE DECELERATION MODULE CONSISTS OF STRUCTURE AND HEAT SHIELDS. THE DESCENT MODULE CONTAINS THE SCIENCE INSTRUMENTS. PROBE ELECTRONICS AND POWER SOURCES ARE VENTED TO THE JOVIAN ATMOSPHERE. A PARACHUTE IS USED TO SEPARATE THE DESCENT MODULE FROM THE DECELERATION MODULE AND TO CONTROL THE PROBE DESCENT RATE. IT MAY BE JETTISONED NEAR THE TERMINATION OF THE MISSION (AT A PRESSURE OF 10 BARS) TO ALLOW A MORE RAPID DESCENT AT THE HIGHER PRESSURES AND TEMPERATURES. IN SITU SCIENCE MEASUREMENTS ARE MADE PRIOR TO AND DURING HIGH SPEED ENTRY AND DESCENT. POWER IS SUPPLIED BY A BATTERY. DATA ARE TELEMETERED TO THE ORBITER, WHICH IN TURN RELAYS THEM TO EARTH. THE IN SITU MEASUREMENTS GIVE INFORMATION ON THE PHYSICAL STRUCTURE, CHEMICAL COMPOSITION, LOCATION OF CLOUDS IN THE TROPOSPHERE, AND THE THERMAL BALANCE OF THE PLANET. DATA ARE STORED IN A MEMORY UNIT FOR THE PERIOD OF COMMUNICATION BLACKOUT DURING ENTRY THEN TRANSMITTED TO THE ORBITER INTERLEAVED WITH REAL-TIME DATA.

----- GALILEO PROBE, BOESE-----

INVESTIGATION NAME- NET FLUX RADIOMETER

NSSDC ID- JOP -04 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
PLANETOLOGY
PLANETARY ATMOSPHERES

PERSONNEL

PI - R.W. BOESE	NASA-ARC
OI - J.B. POLLACK	NASA-ARC
OI - P.M. SILVAGGIO	NASA-ARC

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION ARE TO: (1) MEASURE VERTICAL DISTRIBUTION OF NET FLUX OF SOLAR ENERGY AND PLANETARY EMISSION IN THE REGION OF THE ATMOSPHERE FROM 0.1 TO 10 BARS, (2) DETERMINE THE LOCATION OF CLOUD LAYERS, AND (3) OBTAIN EVIDENCE ON THE MIXING RATIOS OF SELECTED CONSTITUENTS AND THE OPACITY OF CLOUDS AND AEROSOLS IN THE INFRARED. A MULTICHANNEL RADIOMETER MEASURES FLUX IN ABOUT 30-DEG CONES ALTERNATELY CENTERED PLUS OR MINUS 45 DEG FROM THE PROBE HORIZONTAL. IT HAS AN ON BOARD CALIBRATION SYSTEM (2 BLACK BODIES), A MULTIDETECTOR ARRAY (WITH CHANNELS AT APPROXIMATELY 0.3 - 3.0, 0.3 - 2000, 20-30, 30-40, AND 40 - 60 MICROMETERS), AND A SIX PYROELECTRIC DETECTOR ARRAY. IT IS MOUNTED ON THE PROBE WITH EXTERNAL VIEWING AFTER SHIELD DEPLOYMENT. THE TOTAL MASS IS 2.3 KG AND THE TOTAL POWER IS 4.6 W.

----- GALILEO PROBE, LANZEROTTI-----

INVESTIGATION NAME- LIGHTNING

NSSDC ID- JOP -06 INVESTIGATIVE PROGRAM
CODE SL/CO-OP
INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
SPACE PLASMAS
PLANETARY MAGNETIC FIELD

PERSONNEL

PI - L.J. LANZEROTTI	BELL TELEPHONE LAB
OI - G. DEHMEI	BRAUNSCHWEIG TECH U
OI - F.O. GLEIM	BRAUNSCHWEIG TECH U
OI - E.P. KRIDER	U OF ARIZONA
OI - K. RINNERT	MPI-AERONOMY
OI - M. UMAN	U OF FLORIDA

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO: (1) VERIFY THE EXISTENCE OF LIGHTNING ON JUPITER AND MEASURE ITS BASIC PHYSICAL CHARACTERISTICS, AND (2) MEASURE RF NOISE LEVELS AND ONE MAGNETIC FIELD COMPONENT NEAR JUPITER. TWO INSTRUMENTS ARE USED FOR THIS INVESTIGATION - AN ELECTROMAGNETIC SENSOR AND AN OPTICAL SENSOR. THE ELECTROMAGNETIC SENSOR HAS A FERRITE CORE ANTENNA WITH A PREAMPLIFIER AS AN RF SENSOR. THE FREQUENCY DOMAIN IS 3, 15, AND 100 KHZ NARROW-BAND. THE TIME DOMAIN IS 1 HZ TO 100 KHZ, AND THE RESOLUTION IS 16 S. THE OPTICAL SENSOR HAS A PHOTODIODE WITH FISHEYE LENS. THERE IS COINCIDENCE AND ANTICOINCIDENCE BETWEEN THE RF AND OPTICAL SENSORS. THE ELECTROMAGNETIC SENSOR IS MOUNTED UNDER THE PROBE AFTER BODY WHILE THE OPTICAL SENSOR IS MOUNTED ON THE PROBE ENVELOPE LOOKING OUT PERPENDICULAR TO THE PROBE SPIN AXIS. THE TOTAL MASS IS 1.1 KG AND THE TOTAL CONTINUOUS POWER IS 1.0 W.

----- GALILEO PROBE, NIEMANN-----

INVESTIGATION NAME- MASS SPECTROMETER

NSSDC ID- JOP -03 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES

PERSONNEL

PI - H.B. NIEMANN	NASA-GSFC
OI - S.K. ATREYA	U OF MICHIGAN
OI - G.R. CARNIGAN	U OF MICHIGAN
OI - T.M. DONAHUE	U OF MICHIGAN
OI - R.E. HARTLE	NASA-GSFC
OI - D.W. HUNTEN	U OF ARIZONA
OI - T. OWEN	STATE U OF NEW YORK
OI - N.W. SPENCER	NASA-GSFC

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO DETERMINE THE CHEMICAL AND ISOTOPIC COMPOSITION AND PHYSICAL STATE OF THE JOVIAN ATMOSPHERE, INCLUDING VERTICAL VARIATIONS FROM 0.1 TO 10 BARS OR GREATER. MIXING RATIOS ARE DETERMINED OF HE TO ONE PERCENT ACCURACY AND OF H₂O, CH₄, AND NH₃ TO FIVE PERCENT ACCURACY. THE ISOTOPIC RATIO OF NE₂₀ TO NE₂₂ IS MEASURED TO AN ACCURACY OF TWO PERCENT. ALL SPECIES WITH MASS NUMBERS 1-52, PLUS SELECTED SPECIES AT HIGHER MASS NUMBERS (INCLUDING KRYPTON AND XENON) ARE MEASURED. THE INSTRUMENT IS A QUADRUPOLE MASS SPECTROMETER WITH AN ELECTRON IMPACT ION SOURCE HAVING REDUNDANT ELECTRON BEAM GUNS OF VARIABLE KINETIC ENERGY AND A SECONDARY ELECTRON MULTIPLIER ION DETECTOR. THE DUAL-CHANNEL SAMPLE INLET SYSTEM INCLUDES AN ENRICHMENT SYSTEM FOR TRACE GAS AND ISOTOPE DETERMINATION, A TANDEM GETTER, AND A SPUTTER ION PUMP. THE MASS RANGE IS 1-52, 84, AND 131 U. THE DYNAMIC RANGE IS 1E+8. OTHER SPECIES WITH MASSES GREATER THAN 52 CAN BE SOUGHT AT THE SACRIFICE OF INTEGRATION TIME BELOW 52 U. THE SCAN PERIOD IS 3 TO 60 S. THE INSTRUMENT IS MOUNTED ON THE PROBE WITH THE SAMPLE INLET PORT NEAR THE STAGNATION POINT WITH THE SAMPLE OUTLET PORT NEAR THE MINIMUM PRESSURE POINT. THE TOTAL MASS IS 7.1 KG AND THE TOTAL POWER IS 15 W.

----- GALILEO PROBE, RAGENT-----

INVESTIGATION NAME- NEPHELOMETER

NSSDC ID- JOP -05 INVESTIGATIVE PROGRAM
CODE SL/CO-OP
INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - B. RAGENT	NASA-ARC
OI - J.E. BLAMONT	CNRS-SA
OI - G.W. GRAMS	NATL CTR FOR ATMOS RES
OI - J.B. POLLACK	NASA-ARC

BRIEF DESCRIPTION

THIS INVESTIGATION IS TO DETERMINE VERTICAL EXTENT, STRUCTURE, AND MICROPHYSICAL CHARACTERISTICS (PARTICLE SIZE DISTRIBUTION, NUMBER DENSITY, AND PHYSICAL STRUCTURE) OF JUPITER'S CLOUDS OVER THE RANGE 0.1 TO 10 BARS. A SINGLE-WAVELENGTH, MULTIPLE-ANGLE (5) SCATTERING NEPHELOMETER, WITH A GALLIUM-ARSENIC LED (9000 A) SOURCE AND SOLID STATE DETECTORS IS MOUNTED ON THE PROBE WITH APPROPRIATE EXTERNAL VIEWING GEOMETRY. DEPLOYMENT TAKES PLACE AFTER THE HEAT SHIELD IS REMOVED. THE TOTAL MASS IS 1.8 KG AND THE TOTAL CONTINUOUS POWER IS 3.0 W.

----- GALILEO PROBE, SAEFF-----

INVESTIGATION NAME- ATMOSPHERIC STRUCTURE

NSSDC ID- JOP -02 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES

PERSONNEL
 PI - A. SIEFF
 OI - R.C. BLANCHARD
 OI - D.B. KIRK
 OI - G. SCHUBERT
 OI - S.C. SOMMER
 OI - R.E. YOUNG

NASA-ARC
 NASA-LARC
 NASA-ARC
 U OF CALIF, LA
 NASA-ARC
 NASA-ARC

OI - D.A. KNIFFEN
 OI - H.A. MAYER-HASSELWANDER
 OI - T. MCPHARLIN
 OI - H. ROTHERMEL
 OI - E.J. SCHNEID
 OI - M.K. SOMMER
 OI - D.B. THOMPSON

NASA-GSFC
 MPI-EXTRATERR PHYS
 STANFORD U
 MPI-EXTRATERR PHYS
 GRUMMAN AEROSPACE CORP
 MPI-EXTRATERR PHYS
 NASA-GSFC

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO DETERMINE STATE PROPERTY PROFILES (TEMPERATURE, PRESSURE, DENSITY, MOLECULAR WEIGHT) OVER AN ALTITUDE RANGE FROM A THRESHOLD OF ABOUT 1000 KM ABOVE THE CLOUD DECK DOWN TO PROBE FAILURE (DEEPER THAN 10 BAR PRESSURE). THE INSTRUMENT PACKAGE CONSISTS OF ACCELERATION, TEMPERATURE, AND PRESSURE SENSORS AND ASSOCIATED ELECTRONICS. THEY ARE MOUNTED IN THE PROBE WITH ACCELEROMETERS NEAR THE PROBE CENTER OF GRAVITY. THE TEMPERATURE SENSING HEAD AND PRESSURE INLET ARE DEPLOYED OUTSIDE THE PROBE BOUNDARY LAYER. THE TOTAL MASS IS 1.9 KG AND THE TOTAL CONTINUOUS POWER IS 5.5 W.

----- GALILEO PROBE, VON ZAHN-----

INVESTIGATION NAME- HELIUM ABUNDANCE INTERFEROMETER

NSSDC ID- JOP -01

INVESTIGATIVE PROGRAM
 CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
 ATMOSPHERIC PHYSICS
 PLANETARY ATMOSPHERES

PERSONNEL
 PI - U. VON ZAHN
 OI - H.-J. HOFFMAN

U OF BONN
 U OF BONN

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS THE PRECISE (0.1 PERCENT) DETERMINATION OF THE HELIUM ABUNDANCE IN THE JOVIAN ATMOSPHERE FROM 3 TO 8 BARS. A TWO-ARM DOUBLE PATHLENGTH OPTICAL INTERFEROMETER THAT INCLUDES AN IR LIGHT-EMITTING DIODE (LED) LIGHT SOURCE, AN INTERFERENCE FILTER, AND A PHOTODETECTOR ARRAY IS USED TO MEASURE THE REFRACTIVE INDEX DIFFERENCE BETWEEN AN ATMOSPHERE SAMPLE AND A REFERENCE GAS MIXTURE. IT IS MOUNTED ON THE PROBE WITH AN INLET PIPE TO THE AMBIENT ATMOSPHERE. THE TOTAL MASS IS 1.0 KG AND THE TOTAL CONTINUOUS POWER IS 0.7 W.

***** GAMMA-RAY OBSERVATORY*****

SPACECRAFT COMMON NAME- GAMMA-RAY OBSERVATORY
 ALTERNATE NAMES-

NSSDC ID- GRO

LAUNCH DATE- 08/01/85 WEIGHT- 8000. KG
 LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
 LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
 UNITED STATES

NASA-OSS

PLANNED ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC
 ORBIT PERIOD- 92.5 MIN
 PERIAPSIS- 400. KM ALT

INCLINATION- 28.5 DEG
 APOAPSIS- 400. KM ALT

PERSONNEL
 MG - R.E. HALPERN
 SC - A.G. OPP
 PM - J.J. MADDEN
 PS - D.A. KNIFFEN

NASA HEADQUARTERS
 NASA HEADQUARTERS
 NASA-GSFC
 NASA-GSFC

BRIEF DESCRIPTION

THE GRO IS DESIGNED AS A FREE-FLYING SATELLITE LAUNCHED FROM THE SPACE SHUTTLE, CARRYING FIVE GAMMA-RAY INSTRUMENTS THAT REQUIRE SUSTAINED POINTING TOWARD GAMMA-RAY SOURCES IN SPACE. THE SPACECRAFT IS STABILIZED IN THREE AXES. GRO IS SUPPORTED BY A MECHANICAL STRUCTURE WHICH, IN ADDITION TO THE SCIENTIFIC INSTRUMENTS, HOUSES AN ATTITUDE-CONTROL SYSTEM, A POWER SYSTEM, AND A COMMAND AND COMMUNICATIONS SYSTEM. ALL THE MAIN SUBSYSTEMS ARE REDUNDANT FOR INCREASED RELIABILITY OF THE MISSION. THE PLANNED OPERATING LIFE IN ORBIT IS 2 YEARS.

----- GAMMA-RAY OBSERVATORY, FICHTEL-----

INVESTIGATION NAME- HIGH-ENERGY GAMMA-RAY TELESCOPE

NSSDC ID- GRO -04

INVESTIGATIVE PROGRAM
 CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
 GAMMA-RAY ASTRONOMY

PERSONNEL
 PI - C.E. FICHTEL
 PI - R. HOFSTADTER
 PI - K. PINKAU
 OI - B. BERON
 OI - D.L. BERTSCH
 OI - A.J. FAVALE
 OI - R.C. HARTMAN
 OI - E.B. HUGHES

NASA-GSFC
 STANFORD U
 MPI-EXTRATERR PHYS
 STANFORD U
 NASA-GSFC
 GRUMMAN AEROSPACE CORP
 NASA-GSFC
 STANFORD U

BRIEF DESCRIPTION

THE INSTRUMENT IS A PICTORIAL-TYPE TELESCOPE USING A DIGITIZED SPARK CHAMBER TO IDENTIFY THE ELECTRON PAIR PRODUCED BY A GAMMA-RAY INTERACTION, AND A LARGE NAI (TL) SCINTILLATOR CRYSTAL TO DETERMINE THE GAMMA-RAY ENERGY. THE SPECIFIC OBJECTIVES OF THE EXPERIMENT ARE: (1) TO SEARCH FOR LOCALIZED SOURCES (E.G., NEUTRON STARS, BLACK HOLES) IN THE 20 MEV-30 GEV RANGE AND STUDY THEIR PROPERTIES, (2) TO IMPROVE LOCATION ACCURACY OF KNOWN SOURCES, (3) TO SEARCH FOR EVIDENCE OF COSMIC-RAY PARTICLE ACCELERATION IN SUPERNOVA REMNANTS, (4) TO STUDY GAMMA-RAY BURSTS AND LINE EMISSION FROM SOLAR FLARES, (5) TO OBTAIN A DETAILED PICTURE OF THE DIFFUSE GAMMA-RAY EMISSION FROM OUR GALAXY, AND STUDY GALACTIC DYNAMICS, COSMIC-RAY COMPOSITION, AND MAGNETIC FIELDS, (6) TO STUDY OTHER GALAXIES, BOTH NORMAL AND PECULIAR, AND (7) TO STUDY THE DIFFUSE CELESTIAL RADIATION AS IT RELATES TO COSMOLOGY.

----- GAMMA-RAY OBSERVATORY, FISHMAN-----

INVESTIGATION NAME- TRANSIENT-EVENT MONITOR

NSSDC ID- GRO -05

INVESTIGATIVE PROGRAM
 CODE SC

INVESTIGATION DISCIPLINE(S)
 GAMMA-RAY ASTRONOMY

PERSONNEL
 PI - G.J. FISHMAN
 OI - C.A. MEEGAN
 OI - T.A. PARNELL

NASA-MSFC
 NASA-MSFC
 NASA-MSFC

BRIEF DESCRIPTION

THE DETECTOR ARRAY OF THE TRANSIENT EVENT MONITOR PROVIDES DEFINITIVE DATA ON: (1) DISTRIBUTION OF BURST SIZES (LOG N - LOG S CURVE) DOWN TO 6.0 E-15 J/SQ CM, (2) THE PRECISE DIRECTION OF MANY SOURCES THROUGH INTERPLANETARY TIMING, (3) THE GENERAL LOCATION OF NUMEROUS ADDITIONAL BURST SOURCES, AND (4) FLUCTUATIONS AND SPECTRAL CHANGES ON TIME SCALES OF 1 MS OR LESS. THESE DATA NOT ONLY CONSTRAIN THEORIES OF BURST SOURCES AND THEIR EMISSION MECHANISM, BUT MAY PROVIDE IDENTIFICATIONS WITH OPTICAL OR X-RAY OBJECTS. THIS EXPERIMENT CONSISTS OF TWELVE 48-CM-DIAMETER, 1.27-CM THICK NAI (TL) DISCS WITH ANTI-COINCIDENCE SHIELDS.

----- GAMMA-RAY OBSERVATORY, KURFESS-----

INVESTIGATION NAME- 0.1-10 MEV GAMMA-RAY

NSSDC ID- GRO -02

INVESTIGATIVE PROGRAM
 CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
 GAMMA-RAY ASTRONOMY

PERSONNEL
 PI - J.D. KURFESS
 OI - M. ULMER
 OI - W.N. JOHNSON
 OI - R.L. KINZER
 OI - G.H. SHARE

US NAVAL RESEARCH LAB
 NORTHWESTERN U
 US NAVAL RESEARCH LAB
 US NAVAL RESEARCH LAB
 US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

THE INSTRUMENT IS COMPRISED OF FOUR IDENTICAL HIGH-SENSITIVITY SCINTILLATION DETECTORS THAT ARE INDEPENDENTLY MOUNTED ON ONE-AXIS ORIENTATION SYSTEMS. FOR MOST OBSERVATIONS, TWO DETECTORS ARE POINTED AT THE SOURCE, WHILE THE OTHER TWO ARE OFFSET BY 15 DEG FOR SIMULTANEOUS BACKGROUND MEASUREMENTS. FOR TIME-VARIABLE PHENOMENA, ALL FOUR DETECTORS CAN BE POINTED AT THE SOURCE FOR MAXIMUM SENSITIVITY. OF PARTICULAR INTEREST ARE OBSERVATIONS OF NUCLEAR LINE RADIATION FROM SUPERNOVAE, NOVAE, NEUTRON STARS, ACCRETION ONTO BLACK HOLES, SOLAR FLARES AND CONTINUUM RADIATION FROM ALL OF THE ABOVE, PLUS SEYFERT GALAXIES, QUASARS, PULSARS, X-RAY BURSTERS, AND KNOWN HIGH-ENERGY GAMMA-RAY SOURCES. TRANSIENT PHENOMENA OCCURRING ANYWHERE IN THE SKY CAN BE DETECTED.

----- GAMMA-RAY OBSERVATORY, PETERSON-----

INVESTIGATION NAME- GAMMA-RAY SPECTROSCOPY

NSSDC ID- GRO -01

INVESTIGATIVE PROGRAM
 CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
 GAMMA-RAY ASTRONOMY

PERSONNEL
 PI - L.E. PETERSON
 OI - P. DUROUCHOUX
 OI - R. ROCCHIA
 OI - K.C. HURLEY
 OI - M. NIEL
 OI - G. VEDRENNE
 OI - T.L. CLINE
 OI - R. RAMATY

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 NASA-GSFC
 NASA-GSFC

01 - B.J. TEEGARDEN NASA-GSFC
 01 - A.S. JACOBSON NASA-JPL
 01 - W.A. MAHONEY NASA-JPL
 01 - G.R. RIEGLER NASA-JPL
 01 - L. KOCH CENS
 01 - J.L. MATTESON U OF CALIF, SAN DIEGO

BRIEF DESCRIPTION

GAMMA RAYS ARE DETECTED IN THE ENERGY RANGE FROM 0.3 TO 10 MEV, BY A MOSAIC OF 18 COOLED HIGH-PURITY GERMANIUM SOLID-STATE COUNTERS. THE OBSERVATIONAL OBJECTIVES ARE: (1) MEASUREMENT OF GAMMA-RAY LINE INTENSITIES AND THEIR TIME EVOLUTION FROM DISCRETE GALACTIC AND EXTRAGALACTIC SOURCES, (2) MEASUREMENT OF SPECTRA AND TIME VARIATIONS OF CONTINUUM EMISSION FROM THESE AND OTHER DISCRETE SOURCES, (3) MEASUREMENT OF TRANSIENT LINE AND CONTINUUM EMISSION DUE TO TIME-VARYING PHENOMENA FROM OBJECTS SUCH AS X-RAY AND GAMMA-RAY BURST SOURCES AND PULSARS, (4) DETERMINATION OF THE EXTENT AND LUMINOSITY OF LINE AND CONTINUUM EMISSION FROM THE GALACTIC PLANE, AND (5) MEASUREMENT OF THE LINE AND CONTINUUM SPECTRA OF THE DIFFUSE COSMIC BACKGROUND. THESE OBSERVATIONS SHOULD BE USEFUL IN UNDERSTANDING ACCELERATION OF NUCLEONS AND ELECTRONS IN COSMIC PLASMAS, NUCLEOSYNTHESIS AND SUPERNOVAE EXPLOSIONS, ORIGIN AND PROPAGATION OF COSMIC RAYS IN OUR GALAXY, AND THE NATURE OF COMPACT STELLAR OBJECTS AND GALACTIC NUCLEI.

----- GAMMA-RAY OBSERVATORY, SCHONFELDER-----

INVESTIGATION NAME- MEASUREMENT OF 1-30 MEV CELESTIAL GAMMA RAYS WITH AN IMAGING COMPTON TELESCOPE

NSSDC ID- GRO -03 INVESTIGATIVE PROGRAM
 CODE SC/CO-OP
 INVESTIGATION DISCIPLINE(S)
 GAMMA-RAY ASTRONOMY

PERSONNEL

PI - V. SCHONFELDER	MPI-EXTRATERR PHYS
01 - B.N. SWANENBURG	U OF LEIDEN
01 - J.A. LOCKWOOD	U OF NEW HAMPSHIRE
01 - B.G. TAYLOR	ESA-ESTEC
01 - G. KANBACH	MPI-EXTRATERR PHYS
01 - F. MELZNER	MPI-EXTRATERR PHYS
01 - J.A.M. BLEEKER	U OF LEIDEN
01 - A.J.M. DEERENBERG	U OF LEIDEN
01 - W. HERMSEN	U OF LEIDEN
01 - W.R. WEBBER	U OF NEW HAMPSHIRE
01 - K. BENNETT	ESA-ESTEC
01 - R.D. WILLS	ESA-ESTEC

BRIEF DESCRIPTION

THE INVESTIGATION EMPLOYS AN IMAGING COMPTON TELESCOPE THAT COVERS THE 1-TO 30-MEV ENERGY RANGE. THIS INSTRUMENT IS ABLE TO OVERCOME BACKGROUND PROBLEMS AND PROVIDE UNPRECEDENTED SENSITIVITY AND SPATIAL RESOLUTION. THE SCIENTIFIC OBJECTIVES OF THIS EXPERIMENT ARE: (1) STUDY OF INTENSITIES, SPECTRA, SPATIAL DISTRIBUTION OF LOCALIZED SOURCES TO AN INTENSITY ABOUT 1/50 OF THE CRAB NEBULA, (2) STUDY OF THE DIFFUSE GALACTIC EMISSION IN THE ENERGY RANGE WHERE ELECTROMAGNETIC PROCESSES ARE EXPECTED TO DOMINATE, (3) STUDY OF THE DIFFUSE COSMIC EMISSION, AND (4) STUDY OF BROADENED LINE EMISSION FROM EXCITED NUCLEI IN THE DIFFUSE GALACTIC EMISSION AND FROM LOCALIZED SOURCES, INCLUDING THE SUN, USING THE 1-SQ-M NAI DETECTORS WITH AN ENERGY RESOLUTION OF ABOUT 10 PERCENT.

***** GMS-2*****

SPACECRAFT COMMON NAME- GMS-2
 ALTERNATE NAMES- GEOSTATION.METEORO.SAT.2

NSSDC ID- GMS-2

LAUNCH DATE- 08/00/81 WEIGHT- 647. KG
 LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
 LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
 JAPAN NASDA

PLANNED ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC
 ORBIT PERIOD- MIN INCLINATION- DEG
 PERIAPSIS- KM ALT APOAPSIS- KM ALT

PERSONNEL
 PM - N. KODAIRA METEOROL SATELLITE CTR
 PS - JMA STAFF JAPANESE METEOROL AGCY

BRIEF DESCRIPTION

THE GEOSTATIONARY METEOROLOGICAL SATELLITES (GMS) ARE JAPAN'S CONTRIBUTION TO THE INTERNATIONAL GARP (GLOBAL ATMOSPHERIC RESEARCH PROGRAM). ONE MAJOR OBJECTIVE OF GARP WAS TO OBTAIN SYNOPSIS GLOBAL METEOROLOGICAL DATA SETS FOR ONE YEAR'S DURATION (TO INCLUDE TWO OPTIMIZED OBSERVING PERIODS OF A FEW WEEKS EACH). THESE DATA WILL CONTINUE TO SERVE AS RAW MATERIAL TO OPTIMIZE COMPUTER MODELS FOR METEOROLOGICAL PREDICTION. IT WAS HOPED THAT DETERMINATION COULD BE MADE OF THE TIME LIMITATION FOR SHORT-TERM MODELING. THIS SPACECRAFT IS ROUGHLY CYLINDRICAL WITH A HEIGHT OF 345 CM AND DIAMETER OF 216 CM. THE CYLINDRICAL SURFACE IS COVERED WITH SOLAR CELLS WHICH WILL PROVIDE 225 W. THE SATELLITE WILL BE SPIN-STABILIZED WITH A DESPUN EARTH-POINTING ANTENNA. THE

SATELLITE WAS POSITIONED NEAR 140 DEG E AND DESIGNED TO OPERATE FOR 5 YEAR. THIS IS A FOLLOW-ON GMS TYPE SPACECRAFT TO BE LAUNCHED AND CONTROLLED BY NASDA OF JAPAN.

----- GMS-2, JMA STAFF-----

INVESTIGATION NAME- VISIBLE AND INFRARED SPIN-SCAN RADIOMETER (VISSR)

NSSDC ID- GMS-2 -01 INVESTIGATIVE PROGRAM
 APPLICATIONS SATELLITE
 INVESTIGATION DISCIPLINE(S)
 METEOROLOGY

PERSONNEL
 PI - JMA STAFF JAPANESE METEOROL AGCY

BRIEF DESCRIPTION

THE VISIBLE IR SPIN-SCAN RADIOMETER (VISSR) IS SIMILAR TO VISSR EXPERIMENTS ON OTHER GARP (GLOBAL ATMOSPHERIC RESEARCH PROGRAM) SATELLITES SUCH AS GOES 1 AND GMS. IT WILL MAKE BOTH NIGHT (IR 10.5 TO 12.5 MICROMETERS) AND DAY IR, PLUS VISIBLE (.5 TO .75 MICROMETERS) PHOTOMETRIC OBSERVATIONS OF THE SUBSATELLITE AREA AT 30 MIN INTERVALS. REAL-TIME TRANSMISSION IS AVAILABLE TO THE DATA ACQUISITION STATION IN JAPAN, WITH ADDITIONAL DATA TRANSMISSION TO OTHER METEOROLOGICAL USERS AS NEEDED.

----- GMS-2, JMA STAFF-----

INVESTIGATION NAME- WEATHER COMMUNICATIONS FACILITY

NSSDC ID- GMS-2 -03 INVESTIGATIVE PROGRAM
 APPLICATIONS SATELLITE
 INVESTIGATION DISCIPLINE(S)
 METEOROLOGY
 COMMUNICATIONS

PERSONNEL
 PI - JMA STAFF JAPANESE METEOROL AGCY

BRIEF DESCRIPTION

THE GMS-2 INCLUDES A COMMUNICATIONS FACILITY. THE OBJECTIVES OF THIS EQUIPMENT ARE (1) TO COLLECT AND RELAY WEATHER OBSERVATIONS FROM REMOTE STATIONS, INCLUDING BUOYS, SHIPS, AND UNMANNED STATIONS, AND (2) TO TRANSMIT WEATHER INFORMATION AND ANALYSES FROM THE CENTRAL WEATHER FACILITY TO OTHER WEATHER STATIONS.

----- GMS-2, KOHNO-----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR (SEM)

NSSDC ID- GMS-2 -02 INVESTIGATIVE PROGRAM
 APPLICATIONS SATELLITE
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS

PERSONNEL
 PI - T. KOHNO METEOROL RES INST

BRIEF DESCRIPTION

THE SPACE ENVIRONMENT MONITOR (SEM) EXPERIMENT OBSERVES THE IN SITU CHARGED PARTICLE ENVIRONMENT. SOLAR PROTONS (1 TO 500 MEV), ALPHA PARTICLES (8 TO 390 MEV) AND SOLAR ELECTRONS (GREATER THAN 2 MEV) ARE DISCRIMINATED, AND THEIR RESPECTIVE ENERGIES MONITORED BY MEANS OF A NUMBER OF SOLID-STATE DETECTORS.

***** GOES-D*****

SPACECRAFT COMMON NAME- GOES-D
 ALTERNATE NAMES-

NSSDC ID- GOES-D

LAUNCH DATE- 08/26/80 WEIGHT- 660. KG
 LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
 LAUNCH VEHICLE- SHTLE-SSUS

SPONSORING COUNTRY/AGENCY
 UNITED STATES NOAA-NESS
 UNITED STATES NASA-OSTA

PLANNED ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC INCLINATION- 1. DEG
 ORBIT PERIOD- 1440. MIN APOAPSIS- 35786. KM ALT
 PERIAPSIS- 35786. KM ALT

PERSONNEL
 MG - A.J. CERVENKA NASA HEADQUARTERS
 PM - R.H. PICKARD NASA-GSFC
 PS - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION

GOES-D IS THE FOURTH IN A SERIES OF NASA-DEVELOPED, NOAA-OPERATED SPACECRAFT. THE SPIN-STABILIZED, EARTH-SYNCHRONOUS SPACECRAFT CARRIES (1) A VISSR (VISIBLE INFRARED SPIN SCAN RADIOMETER) ATMOSPHERIC SOUNDER (VAS) TO PROVIDE HIGH-QUALITY DAY/NIGHT CLOUDCOVER DATA, TO TAKE RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, AND TO DETERMINE ATMOSPHERIC TEMPERATURE AND WATER CONTENT AT VARIOUS LEVELS, (2) A METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM TO RELAY PROCESSED DATA FROM CENTRAL WEATHER FACILITIES TO SMALL AUTOMATIC PICTURE TRANSMISSION (APT)-EQUIPPED REGIONAL STATIONS AND TO COLLECT AND RETRANSMIT DATA FROM REMOTELY LOCATED EARTH-BASED PLATFORMS, AND (3) A SPACE ENVIRONMENT MONITOR (SEM) SYSTEM TO MEASURE PROTON, ELECTRON, AND SOLAR X-RAY FLUXES AND MAGNETIC FIELDS. THE CYLINDRICALLY SHAPED SPACECRAFT MEASURES 190.5 CM IN DIAM AND 230 CM IN LENGTH, EXCLUSIVE OF A MAGNETOMETER THAT EXTENDS AN ADDITIONAL 83 CM BEYOND THE CYLINDRICAL SHELL. THE PRIMARY STRUCTURAL MEMBERS ARE A HONEYCOMBED EQUIPMENT SHELF AND THRUST TUBE. THE VISSR TELESCOPE IS MOUNTED ON THE EQUIPMENT SHELF AND VIEWS THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDS RADIALLY FROM THE THRUST TUBE AND IS AFFIXED TO THE SOLAR PANELS, WHICH FORMS THE OUTER WALLS OF THE SPACECRAFT TO PROVIDE THE PRIMARY SOURCE OF ELECTRICAL POWER. LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE THRUST TUBE AND THE SOLAR PANELS ARE STATIONKEEPING AND DYNAMICS CONTROL EQUIPMENT, BATTERIES, AND MOST OF THE SEM EQUIPMENT. PROPER SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) ARE MAINTAINED BY TWO SEPARATE SETS OF JET THRUSTERS MOUNTED AROUND THE SPACECRAFT'S EQUATOR AND ACTIVATED BY GROUND COMMAND. THE SPACECRAFT USES BOTH UHF-BAND AND S-BAND FREQUENCIES IN ITS TELEMETRY AND COMMAND SUBSYSTEM. A LOW-POWER VHF TRANSPONDER PROVIDES TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVES AS A BACKUP FOR THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT HAS ATTAINED SYNCHRONOUS ORBIT.

----- GOES-D, NESS STAFF-----

INVESTIGATION NAME- VISIBLE-INFRARED SPIN SCAN RADIOMETER (VISSR)

NSSDC ID- GOES-D -01 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - NESS STAFF NOAA-NESS
OI - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION

THE VISIBLE INFRARED SPIN SCAN RADIOMETER (VISSR) FLOWN ON GOES-D IS CAPABLE OF PROVIDING BOTH DAY AND NIGHT OBSERVATIONS OF CLOUD COVER AND EARTH/DAY RADIANCE TEMPERATURE MEASUREMENTS FROM A SYNCHRONOUS, SPIN-STABILIZED, GEOSTATIONARY SATELLITE FOR USE IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE TWO-CHANNEL INSTRUMENT IS ABLE TO TAKE BOTH FULL AND PARTIAL PICTURES OF THE EARTH'S DISK. BOTH THE INFRARED CHANNEL (10.5 TO 12.5 MICROMETERS) AND THE VISIBLE CHANNEL (0.55 TO 0.75 MICROMETER) USE A COMMON OPTICS SYSTEM. INCOMING RADIATION IS RECEIVED BY AN ELLIPTICALLY-SHAPED SCAN MIRROR AND COLLECTED BY A RICHEY-CHRETIEN OPTICAL SYSTEM. THE SCAN MIRROR IS SET AT A NOMINAL ANGLE OF 45 DEG TO THE VISSR OPTICAL AXIS, WHICH IS ALIGNED PARALLEL TO THE SPIN AXIS OF THE SPACECRAFT. THE SPINNING MOTION OF THE SPACECRAFT (APPROXIMATELY 100 RPM) PROVIDES A WEST-TO-EAST SCAN MOTION WHEN THE SPIN AXIS OF THE SPACECRAFT IS ORIENTED PARALLEL WITH THE EARTH'S AXIS. THE LATITUDINAL SCAN IS ACCOMPLISHED BY SEQUENTIALLY TILTING THE SCANNING MIRROR NORTH TO SOUTH AT THE COMPLETION OF EACH SPIN. A FULL PICTURE TAKES 18.2 MIN TO COMPLETE AND ABOUT 2 MIN TO RETRACE. DURING EACH SCAN, EIGHT VISIBLE-SPECTRUM DETECTORS SWEEP THE EARTH, WITH A GROUND RESOLUTION OF 0.9 KM AT ZERO NADIR ANGLE. A MERCURY-CADMIUM TELLURIDE DETECTOR SENSES THE INFRARED PORTION OF THE SPECTRUM WITH A HORIZONTAL RESOLUTION OF APPROXIMATELY 9 KM AT ZERO NADIR ANGLE. THE INFRARED PORTION OF THE DETECTOR MEASURES RADIANCE TEMPERATURES BETWEEN 180 AND 315 DEG K WITH A PROPOSED SENSITIVITY BETWEEN 0.4 AND 1.4 K. THE VISSR OUTPUT IS DIGITIZED AND TRANSMITTED TO THE NOAA COMMAND DATA ACQUISITION STATION, WALLOPS ISLAND, VA. THERE THE SIGNAL IS FED INTO A 'LINE STRETCHER,' WHERE IT IS STORED AND TIME-STRETCHED FOR TRANSMISSION BACK TO THE SATELLITE AT REDUCED BANDWIDTH FOR REBROADCAST TO APT USER STATIONS. AS WITH ALL OPERATIONAL-TYPE DATA, THE VISSR DATA ARE HANDLED BY NOAA AND EVENTUALLY SENT TO THE NATIONAL CLIMATIC CENTER AT ASHEVILLE, NORTH CAROLINA, FOR ARCHIVING.

----- GOES-D, NESS STAFF-----

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM

NSSDC ID- GOES-D -05 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM IS AN EXPERIMENTAL COMMUNICATIONS AND DATA HANDLING SYSTEM DESIGNED TO RECEIVE AND PROCESS METEOROLOGICAL DATA COLLECTED FROM REMOTELY LOCATED EARTH-BASED DATA COLLECTION (OBSERVATION) PLATFORMS (DCP). THE COLLECTED DATA ARE RETRANSMITTED FROM THE SATELLITE TO SMALL, GROUND-BASED, REGIONAL DATA UTILIZATION CENTERS. DATA FROM UP TO 10,000 DCP STATIONS CAN BE HANDLED BY THE SYSTEM. THE SYSTEM ALSO ALLOWS FOR THE RETRANSMISSION OF NARROW-BAND (WEFAX TYPE) DATA FROM CENTRALIZED WEATHER FACILITIES TO EXISTING SMALL, GROUND-BASED APT RECEIVING STATIONS. THIS COMMUNICATIONS SYSTEM OPERATES ON S-BAND FREQUENCIES. THE MINIMUM DATA COLLECTION SYSTEM FOR ONE SMALL METEOROLOGICAL SATELLITE CONSISTS OF APPROXIMATELY 3500 DCP STATIONS TO BE CONTACTED IN A 6-H PERIOD. THE TOTAL AMOUNT OF DATA COLLECTED DURING THE 6-H PERIOD IS BETWEEN 350K AND 600K BITS, DEPENDING ON THE CODING TECHNIQUES. DATA RECEIVED FROM INDIVIDUAL STATIONS VARY FROM 50 TO 3000 BITS, DEPENDING ON THE TYPE AND VARIETY OF SENSORS USED AT AN INDIVIDUAL DCP STATION.

----- GOES-D, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR

NSSDC ID- GOES-D -02 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS NOAA-ERL
OI - H.H. SAUER NOAA-ERL

BRIEF DESCRIPTION

THE ENERGETIC PARTICLE MONITOR CONSISTS OF THREE DEYECTOR ASSEMBLIES, EACH COVERING LIMITED REGIONS OF THE OVERALL ENERGY SPECTRUM. THE FIRST TWO DETECTOR ASSEMBLIES MONITOR PROTONS IN SEVEN ENERGY RANGES BETWEEN 0.8 AND 500 MEV, AND ALPHA PARTICLES IN SIX RANGES BETWEEN 4 AND .GT. 400 MEV. THERE IS ALSO ONE CHANNEL FOR THE MEASUREMENT OF ELECTRONS IN THE RANGE .GE. 500 KEV.

----- GOES-D, WILLIAMS-----

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSSDC ID- GOES-D -03 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - D.J. WILLIAMS NOAA-ERL
OI - R.F. DONNELLY NOAA-ERL

BRIEF DESCRIPTION

THE X-RAY MONITOR CONSISTS OF ION CHAMBER DETECTORS. THE RANGES AND MINIMUM USEFUL THRESHOLD SENSITIVITY ARE 0.5 TO 3A, 1.0E-13 J PER CM PER S AND 1 TO 8A, 1.0E-12 J PER CM PER S WITH A DYNAMIC RANGE OF 1.E4.

----- GOES-D, WILLIAMS-----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- GOES-D -04 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS NOAA-ERL
OI - J.N. BARFIELD NOAA-ERL

BRIEF DESCRIPTION

THE MAGNETOMETER HAS A RANGE OF PLUS OR MINUS 400 NT (WITHOUT SATURATION) AND A RESOLUTION OF 0.1 NT OVER A RANGE OF PLUS OR MINUS 50 NT.

***** GOES-E*****

SPACECRAFT COMMON NAME- GOES-E
ALTERNATE NAMES-

NSSDC ID- GOES-E

LAUNCH DATE- 03/26/81 WEIGHT- 660. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHTEL-SSUS

ORIGINAL PAGE A
OF POOR QUALITY

SPONSORING COUNTRY/AGENCY
UNITED STATES
UNITED STATES

NOAA-NESS
NASA-OSTA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1440. MIN
PERIAPSIS- 35786. KM ALT

INCLINATION- 1. DEG
APOAPSIS- 35786. KM ALT

PERSONNEL
MG - A.J. CERVENKA
PM - R.H. PICKARD
PS - W.E. SHENK

NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

GOES-E IS THE FIFTH IN A SERIES OF NASA-DEVELOPED, NOAA-OPERATED SPACECRAFT. THE SPIN-STABILIZED, EARTH-SYNCHRONOUS SPACECRAFT CARRIES (1) A VISIBLE INFRARED SPIN SCAN RADIOMETER (VISSR) ATMOSPHERIC SOUNDER (VAS) TO PROVIDE HIGH-QUALITY DAY/NIGHT CLOUDCOVER DATA, TO TAKE RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, AND TO DETERMINE ATMOSPHERIC TEMPERATURE AND WATER CONTENT AT VARIOUS LEVELS, (2) A METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM TO RELAY PROCESSED DATA FROM CENTRAL WEATHER FACILITIES TO SMALL AUTOMATIC PICTURE TRANSMISSION (APT)-EQUIPPED REGIONAL STATIONS AND TO COLLECT AND RETRANSMIT DATA FROM REMOTELY LOCATED EARTH-BASED PLATFORMS, AND (3) A SPACE ENVIRONMENT MONITOR (SEM) SYSTEM TO MEASURE PROTON, ELECTRON, AND SOLAR X-RAY FLUXES AND MAGNETIC FIELDS. THE CYLINDRICALLY SHAPED SPACECRAFT MEASURES 190.5 CM IN DIAM AND 230 CM IN LENGTH, EXCLUSIVE OF A MAGNETOMETER THAT EXTENDS AN ADDITIONAL 83 CM BEYOND THE CYLINDRICAL SHELL. THE PRIMARY STRUCTURAL MEMBERS ARE A HONEYCOMBED EQUIPMENT SHELF AND THRUST TUBE. THE VISSR TELESCOPE IS MOUNTED ON THE EQUIPMENT SHELF AND VIEWS THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDS RADIALLY FROM THE THRUST TUBE AND IS AFFIXED TO THE SOLAR PANELS, WHICH FORMS THE OUTER WALLS OF THE SPACECRAFT TO PROVIDE THE PRIMARY SOURCE OF ELECTRICAL POWER. LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE THRUST TUBE AND THE SOLAR PANELS ARE STATIONKEEPING AND DYNAMICS CONTROL EQUIPMENT, BATTERIES, AND MOST OF THE SEM EQUIPMENT. PROPER SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) ARE MAINTAINED BY TWO SEPARATE SETS OF JET THRUSTERS MOUNTED AROUND THE SPACECRAFT'S EQUATOR AND ACTIVATED BY GROUND COMMAND. THE SPACECRAFT USES BOTH UHF-BAND AND S-BAND FREQUENCIES IN ITS TELEMETRY AND COMMAND SUBSYSTEM. A LOW-POWER VHF TRANSPONDER PROVIDES TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVES AS A BACKUP FOR THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT HAS ATTAINED SYNCHRONOUS ORBIT.

----- GOES-E, NESS STAFF-----

INVESTIGATION NAME- VISIBLE-INFRARED SPIN SCAN RADIOMETER (VISSR)

NSSDC ID- GOES-E -01 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF
OI - W.E. SHENK

NOAA-NESS
NASA-GSFC

BRIEF DESCRIPTION

THE VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR) FLOWN ON GOES-E IS CAPABLE OF PROVIDING BOTH DAY AND NIGHT OBSERVATIONS OF CLOUD COVER AND EARTH/CLOUD RADIANCE TEMPERATURE MEASUREMENTS FROM A SYNCHRONOUS, SPIN-STABILIZED, GEOSTATIONARY SATELLITE FOR USE IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE TWO-CHANNEL INSTRUMENT IS ABLE TO TAKE BOTH FULL AND PARTIAL PICTURES OF THE EARTH'S DISK. BOTH THE INFRARED CHANNEL (10.5 TO 12.5 MICROMETERS) AND THE VISIBLE CHANNEL (0.55 TO 0.75 MICROMETERS) USE A COMMON OPTICS SYSTEM. INCOMING RADIATION IS RECEIVED BY AN ELLIPTICALLY-SHAPED SCAN MIRROR AND COLLECTED BY A RICHEY-CHRETIEN OPTICAL SYSTEM. THE SCAN MIRROR IS SET AT A NOMINAL ANGLE OF 45 DEG TO THE VISSR OPTICAL AXIS, WHICH IS ALIGNED PARALLEL TO THE SPIN AXIS OF THE SPACECRAFT. THE SPINNING MOTION OF THE SPACECRAFT (APPROXIMATELY 100 RPM) PROVIDES A WEST-TO-EAST SCAN MOTION WHEN THE SPIN AXIS OF THE SPACECRAFT IS ORIENTED PARALLEL WITH THE EARTH'S AXIS. THE LATITUDINAL SCAN IS ACCOMPLISHED BY SEQUENTIALLY TILTING THE SCANNING MIRROR NORTH TO SOUTH AT THE COMPLETION OF EACH SPIN. A FULL PICTURE TAKES 18.2 MIN TO COMPLETE AND ABOUT 2 MIN TO RETRACE. DURING EACH SCAN, EIGHT VISIBLE-SPECTRUM DETECTORS SWEEP THE EARTH, WITH A GROUND RESOLUTION OF 0.9 KM AT ZERO NADIR ANGLE. A MERCURY-CADMIUM TELLURIDE DETECTOR SENSES THE INFRARED PORTION OF THE SPECTRUM WITH A HORIZONTAL RESOLUTION OF APPROXIMATELY 9 KM AT ZERO NADIR ANGLE. THE INFRARED PORTION OF THE DETECTOR MEASURES RADIANCE TEMPERATURES BETWEEN 180 AND 315 DEG K WITH A PROPOSED SENSITIVITY BETWEEN 0.4 AND 1.4 K. THE VISSR OUTPUT IS DIGITIZED AND TRANSMITTED TO THE NOAA COMMAND DATA ACQUISITION STATION, WALLOPS ISLAND, VA. THERE THE SIGNAL IS FED INTO A 'LINE STRETCHER,' WHERE IT IS STORED AND TIME-STRETCHED FOR TRANSMISSION BACK TO THE SATELLITE AT REDUCED BANDWIDTH FOR REBROADCAST TO APT USER STATIONS. AS WITH ALL OPERATIONAL TYPE DATA, THE VISSR DATA ARE HANDLED BY NOAA AND EVENTUALLY SENT TO THE NATIONAL CLIMATIC CENTER AT ASHEVILLE, NORTH CAROLINA, FOR ARCHIVING.

----- GOES-E, NESS STAFF-----

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM

NSSDC ID- GOES-E -05 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM IS AN EXPERIMENTAL COMMUNICATIONS AND DATA HANDLING SYSTEM DESIGNED TO RECEIVE AND PROCESS METEOROLOGICAL DATA COLLECTED FROM REMOTELY LOCATED EARTH-BASED DATA COLLECTION (OBSERVATION) PLATFORMS (DCP). THE COLLECTED DATA ARE RETRANSMITTED FROM THE SATELLITE TO SMALL, GROUND-BASED, REGIONAL DATA UTILIZATION CENTERS. DATA FROM UP TO 10,000 DCP STATIONS CAN BE HANDLED BY THE SYSTEM. THE SYSTEM ALSO ALLOWS FOR THE RETRANSMISSION OF NARROW-BAND (WEFAX TYPE) DATA FROM CENTRALIZED WEATHER FACILITIES TO EXISTING SMALL, GROUND-BASED APT RECEIVING STATIONS. THIS COMMUNICATIONS SYSTEM OPERATES ON S-BAND FREQUENCIES. THE MINIMUM DATA COLLECTION SYSTEM FOR ONE SMALL METEOROLOGICAL SATELLITE CONSISTS OF APPROXIMATELY 3500 DCP STATIONS TO BE CONTACTED IN A 6-H PERIOD. THE TOTAL AMOUNT OF DATA COLLECTED DURING THE 6-H PERIOD IS BETWEEN 350K AND 600K BITS, DEPENDING ON THE CODING TECHNIQUES. DATA RECEIVED FROM INDIVIDUAL STATIONS VARY FROM 50 TO 3000 BITS, DEPENDING ON THE TYPE AND VARIETY OF SENSORS USED AT AN INDIVIDUAL DCP STATION.

----- GOES-E, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR

NSSDC ID- GOES-E -02 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - H.H. SAUER NOAA-ERL

BRIEF DESCRIPTION

THE ENERGETIC PARTICLE MONITOR CONSISTS OF THREE DETECTOR ASSEMBLIES, EACH COVERING LIMITED REGIONS OF THE OVERALL ENERGY SPECTRUM. THE FIRST TWO DETECTOR ASSEMBLIES MONITOR PROTONS IN SEVEN ENERGY RANGES BETWEEN 0.8 AND 500 MEV AND ALPHA PARTICLES IN SIX RANGES BETWEEN 4 AND .GT. 400 MEV. THERE IS ALSO ONE CHANNEL FOR THE MEASUREMENT OF ELECTRONS IN THE .GE. 500 KEV RANGE.

----- GOES-E, WILLIAMS-----

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSSDC ID- GOES-E -03 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - R.F. DONNELLY NOAA-ERL

BRIEF DESCRIPTION

THE X-RAY MONITOR CONSISTS OF ION CHAMBER DETECTORS. THE RANGES AND MINIMUM USEFUL THRESHOLD SENSITIVITY ARE 0.5 TO 3A, 1.0E-13 J PER SQ CM PER S AND 1 TO 8A, 1.0E-12 J PER SQ CM PER S WITH A DYNAMIC RANGE OF 1.E4.

----- GOES-E, WILLIAMS-----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- GOES-E -04 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - J.N. BARFIELD NOAA-ERL

BRIEF DESCRIPTION

THE MAGNETOMETER WILL HAVE A RANGE OF PLUS OR MINUS 400 NT (WITHOUT SATURATION) AND A RESOLUTION OF 0.1 NT OVER A RANGE OF PLUS OR MINUS 50 NT.

***** GOES-F*****

SPACECRAFT COMMON NAME- GOES-F
ALTERNATE NAMES-

NSSDC ID- GOES-F

LAUNCH DATE- 02/24/82 WEIGHT- 660. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHTLE-SSUS

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS
UNITED STATES NASA-OSTA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC INCLINATION- 1. DEG
ORBIT PERIOD- 1440. MIN APOAPSIS- 35786. KM ALT
PERIAPSIS- 35786. KM ALT

PERSONNEL
MG - A.J. CERVENKA NASA HEADQUARTERS
PM - R.H. PICKARD NASA-GSFC
PS - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION
GOES-F IS THE SIXTH IN A SERIES OF NASA-DEVELOPED, NOAA-OPERATED SPACECRAFT. THE SPIN-STABILIZED, EARTH-SYNCHRONOUS SPACECRAFT CARRIES (1) A VISIBLE INFRARED SPIN SCAN RADIOMETER (VISSR) ATMOSPHERIC SOUNDER (VAS) TO PROVIDE HIGH-QUALITY DAY/NIGHT CLOUDCOVER DATA, TO TAKE RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, AND TO DETERMINE ATMOSPHERIC TEMPERATURE AND WATER CONTENT AT VARIOUS LEVELS, (2) A METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM TO RELAY PROCESSED DATA FROM CENTRAL WEATHER FACILITIES TO SMALL AUTOMATIC PICTURE TRANSMISSION (APT)-EQUIPPED REGIONAL STATIONS AND TO COLLECT AND RETRANSMIT DATA FROM REMOTELY LOCATED EARTH-BASED PLATFORMS, AND (3) A SPACE ENVIRONMENT MONITOR (SEM) SYSTEM TO MEASURE PROTON, ELECTRON, AND SOLAR X-RAY FLUXES AND MAGNETIC FIELDS. THE CYLINDRICALLY SHAPED SPACECRAFT MEASURES 190.5 CM IN DIAM AND 230 CM IN LENGTH, EXCLUSIVE OF A MAGNETOMETER THAT EXTENDS AN ADDITIONAL 83 CM BEYOND THE CYLINDRICAL SHELL. THE PRIMARY STRUCTURAL MEMBERS ARE A HONEYCOMBED EQUIPMENT SHELF AND THRUST TUBE. THE VISSR TELESCOPE IS MOUNTED ON THE EQUIPMENT SHELF AND VIEWS THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDS RADially FROM THE THRUST TUBE AND IS AFFIXED TO THE SOLAR PANELS, WHICH FORMS THE OUTER WALL OF THE SPACECRAFT TO PROVIDE THE PRIMARY SOURCE OF ELECTRICAL POWER. LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE THRUST TUBE AND THE SOLAR PANELS ARE STATIONKEEPING AND DYNAMICS CONTROL EQUIPMENT, BATTERIES, AND MOST OF THE SEM EQUIPMENT. PROPER SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) ARE MAINTAINED BY TWO SEPARATE SETS OF JET THRUSTERS MOUNTED AROUND THE SPACECRAFT'S EQUATOR AND ACTIVATED BY GROUND COMMAND. THE SPACECRAFT USES BOTH UHF-BAND AND S-BAND FREQUENCIES IN ITS TELEMETRY AND COMMAND SUBSYSTEM. A LOW-POWER VHF TRANSPONDER PROVIDES TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVES AS A BACKUP FOR THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT HAS ATTAINED SYNCHRONOUS ORBIT.

----- GOES-F, NESS STAFF-----

INVESTIGATION NAME- VISIBLE-INFRARED SPIN SCAN RADIOMETER (VISSR)

NSSDC ID- GOES-F -01 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS
OI - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION
THE VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR) FLOWN ON GOES-F IS CAPABLE OF PROVIDING BOTH DAY AND NIGHT OBSERVATIONS OF CLOUD COVER AND EARTH/CLOUD RADIANCE TEMPERATURE MEASUREMENTS FROM A SYNCHRONOUS, SPIN-STABILIZED, GEOSTATIONARY SATELLITE FOR USE IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE TWO-CHANNEL INSTRUMENT IS ABLE TO TAKE BOTH FULL AND PARTIAL PICTURES OF THE EARTH'S DISK. BOTH THE INFRARED CHANNEL (10.5 TO 12.5 MICROMETERS) AND THE VISIBLE CHANNEL (0.55 TO 0.75 MICROMETER) USE A COMMON OPTICS SYSTEM. INCOMING RADIATION IS RECEIVED BY AN ELLIPTICALLY-SHAPED SCAN MIRROR AND COLLECTED BY A RICHEY-CHRETIEN OPTICAL SYSTEM. THE SCAN MIRROR IS SET AT A NOMINAL ANGLE OF 45 DEG TO THE VISSR OPTICAL AXIS, WHICH IS ALIGNED PARALLEL TO THE SPIN AXIS OF THE SPACECRAFT. THE SPINNING MOTION OF THE SPACECRAFT (APPROXIMATELY 100 RPM) PROVIDES A WEST-TO-EAST SCAN MOTION WHEN THE SPIN AXIS OF THE SPACECRAFT IS ORIENTED PARALLEL WITH THE EARTH'S AXIS. THE LATITUDINAL SCAN IS ACCOMPLISHED BY SEQUENTIALLY TILTING THE SCANNING MIRROR NORTH TO SOUTH AT THE COMPLETION OF EACH SPIN. A FULL PICTURE TAKES 18.2 MIN TO COMPLETE AND ABOUT 2 MIN TO RETRACE. DURING EACH SCAN, EIGHT VISIBLE-SPECTRUM DETECTORS SWEEP THE EARTH, WITH A GROUND RESOLUTION OF 0.9 KM AT ZERO NADIR ANGLE. A MERCURY-CADMIUM TELLURIDE DETECTOR SENSES THE INFRARED PORTION OF THE SPECTRUM WITH A HORIZONTAL RESOLUTION OF APPROXIMATELY 9 KM AT ZERO NADIR ANGLE. THE INFRARED PORTION OF THE DETECTOR MEASURES RADIANCE TEMPERATURES BETWEEN 180 AND 315 DEG K WITH A PROPOSED

SENSITIVITY BETWEEN 0.4 AND 1.4 K. THE VISSR OUTPUT IS DIGITIZED AND TRANSMITTED TO THE NOAA COMMAND DATA ACQUISITION STATION, WALLOPS ISLAND, VA. THERE THE SIGNAL IS FED INTO A 'LINE STRETCHER,' WHERE IT IS STORED AND TIME-STRETCHED FOR TRANSMISSION BACK TO THE SATELLITE AT REDUCED BANDWIDTH FOR REBROADCAST TO APT USER STATIONS. AS WITH ALL OPERATIONAL-TYPE DATA, THE VISSR DATA ARE HANDLED BY NOAA AND EVENTUALLY SENT TO THE NATIONAL CLIMATIC CENTER AT ASHEVILLE, NORTH CAROLINA, FOR ARCHIVING.

----- GOES-F, NESS STAFF-----

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSIONS SYSTEM

NSSDC ID- GOES-F -05 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM IS AN EXPERIMENTAL COMMUNICATIONS AND DATA HANDLING SYSTEM DESIGNED TO RECEIVE AND PROCESS METEOROLOGICAL DATA COLLECTED FROM REMOTELY LOCATED EARTH-BASED DATA COLLECTION (OBSERVATION) PLATFORMS (DCP). THE COLLECTED DATA ARE RETRANSMITTED FROM THE SATELLITE TO SMALL, GROUND-BASED, REGIONAL DATA UTILIZATION CENTERS. DATA FROM UP TO 10,000 DCP STATIONS CAN BE HANDLED BY THE SYSTEM. THE SYSTEM ALSO ALLOWS FOR THE RETRANSMISSION OF NARROW-BAND (WEFAX TYPE) DATA FROM CENTRALIZED WEATHER FACILITIES TO SMALL GROUND-BASED APT RECEIVING STATIONS. THIS COMMUNICATIONS SYSTEM OPERATES ON S-BAND FREQUENCIES. THE MINIMUM DATA COLLECTION SYSTEM FOR ONE SMALL METEOROLOGICAL SATELLITE CONSISTS OF APPROXIMATELY 3500 DCP STATIONS TO BE CONTACTED IN A 6-H PERIOD. THE TOTAL AMOUNT OF DATA COLLECTED DURING THE 6-H PERIOD IS BETWEEN 350 K AND 600 K BITS, DEPENDING ON THE CODING TECHNIQUES. DATA RECEIVED FROM INDIVIDUAL STATIONS VARY FROM 50 TO 3000 BITS, DEPENDING ON THE TYPE AND VARIETY OF SENSORS USED AT AN INDIVIDUAL DCP STATION.

----- GOES-F, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR

NSSDC ID- GOES-F -02 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - H.H. SAUER NOAA-ERL

BRIEF DESCRIPTION
THE ENERGETIC PARTICLE MONITOR CONSISTS OF THREE DETECTOR ASSEMBLIES, EACH COVERING LIMITED REGIONS OF THE OVERALL ENERGY SPECTRUM. THE FIRST TWO DETECTOR ASSEMBLIES MONITOR PROTONS IN SEVEN ENERGY RANGES BETWEEN 0.8 AND 500 MEV, AND ALPHA PARTICLES IN SIX RANGES BETWEEN 4 AND .GT. 400 MEV. THERE IS ALSO ONE CHANNEL FOR THE MEASUREMENT OF ELECTRONS IN THE .GE. 500 KEV RANGE.

----- GOES-F, WILLIAMS-----

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSSDC ID- GOES-F -03 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - R.F. DONNELLY NOAA-ERL

BRIEF DESCRIPTION
THE X-RAY MONITOR CONSISTS OF ION CHAMBER DETECTORS. THE RANGES AND MINIMUM USEFUL THRESHOLD SENSITIVITY ARE 0.5 TO 3A, 1.0E-13 J PER SQ CM PER S AND 1 TO 8A, 1.0E-12 J PER SQ CM PER S WITH A DYNAMIC RANGE OF 1.E4.

----- GOES-F, WILLIAMS-----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- GOES-F -04 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS
OI - J.N. BARFIELD

NOAA-ERL
NOAA-ERL

BRIEF DESCRIPTION

THE MAGNETOMETER HAS A RANGE OF PLUS OR MINUS 400 NT (WITHOUT SATURATION) AND A RESOLUTION OF 0.1 NT OVER A RANGE OF PLUS OR MINUS 50 NT.

***** HEAO-C*****

SPACECRAFT COMMON NAME- HEAO-C

ALTERNATE NAMES- HIGH ENERGY ASTRON OBS-C

NSSDC ID- HEAO-C

LAUNCH DATE- 09/14/79 WEIGHT- 2660. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSS

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 93.7 MIN
PERIAPSIS- 480. KM ALT

INCLINATION- 45. DEG
APOAPSIS- 480. KM ALT

PERSONNEL

MG - R.E. HALPERN
SC - A.G. OPP
PM - F.A. SPEER
PS - T.A. PARNELL

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-MSFC
NASA-MSFC

BRIEF DESCRIPTION

THIS THIRD MISSION PERFORMS A SKY SURVEY OF GAMMA RAYS AND COSMIC RAYS IN A MANNER SIMILAR TO HEAO 1. A HIGHER ORBITAL INCLINATION THAN THE PREVIOUS MISSIONS IN THIS SERIES IS PLANNED SINCE THE PAYLOAD CONSISTS PRIMARILY OF COSMIC-RAY INSTRUMENTATION; GREATER COSMIC-RAY FLUX OCCURS NEAR THE EARTH'S MAGNETIC POLES. THE SCIENTIFIC OBJECTIVES OF THE MISSION ARE TO -- (1) DETERMINE THE ISOTOPIC COMPOSITION OF THE MOST ABUNDANT COMPONENTS OF THE COSMIC-RAY FLUX WITH ATOMIC MASS BETWEEN 7 AND 56, AND THE FLUX OF EACH ELEMENT WITH ATOMIC NUMBER (Z) BETWEEN Z = 4 AND Z = 50; (2) SEARCH FOR SUPER-HEAVY NUCLEI UP TO Z = 120, AND MEASURE THE COMPOSITION OF THE NUCLEI WITH Z > 20; (3) STUDY INTENSITY, SPECTRUM, AND TIME BEHAVIOR OF X-RAY AND GAMMA-RAY SOURCES BETWEEN 0.06 AND 10 MEV, AND MEASURE ISOTROPY OF THE DIFFUSE X-RAY AND GAMMA-RAY BACKGROUND; AND (4) PERFORM AN EXPLORATORY SEARCH FOR X- AND GAMMA-RAY LINE EMISSIONS. THE NORMAL OPERATING MODE IS A CONTINUOUS CELESTIAL SCAN ABOUT THE Z-AXIS (WHICH NOMINALLY POINTS TO THE SUN).

----- HEAO-C, ISRAEL-----

INVESTIGATION NAME- HEAVY NUCLEII

NSSDC ID- HEAO-C -03

INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS
HIGH ENERGY ASTROPHYSICS

PERSONNEL

PI - M.H. ISRAEL
PI - E.C. STONE
PI - C.J. WASHINGTON
OI - W.R. BINNS
OI - J. KLARMANN
OI - R.E. VOGT

WASHINGTON U
CALIF INST OF TECH
U OF MINNESOTA
MCDONNELL-DOUGLAS CORP
WASHINGTON U
CALIF INST OF TECH

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT IS TO MEASURE THE CHARGE SPECTRUM OF COSMIC-RAY NUCLEI OVER THE NUCLEAR CHARGE RANGE FROM 17 TO 120 IN THE ENERGY INTERVAL 0.3- TO 10-GEV/NUCLEON TO CHARACTERIZE COSMIC RAY SOURCES, PROCESSES OF SYNTHETICS, AND PROPAGATION MODES. THE DETECTOR CONSISTS OF A DOUBLE-ENDED INSTRUMENT OF UPPER AND LOWER HODOSCOPES AND THREE DUAL-GAP ION CHAMBERS. THE TWO ENDS ARE SEPARATED BY A CERENKOV RADIATOR. THE GEOMETRICAL FACTOR IS 4 SQ CM-SR. THE ION CHAMBERS CAN RESOLVE CHARGE TO 0.24 CHARGE UNITS AT LOW ENERGY AND 0.39 CHARGE UNITS AT HIGH ENERGY AND HIGH Z. THE CERENKOV COUNTER CAN RESOLVE 0.3 TO 0.4 CHARGE UNITS.

----- HEAO-C, JACOBSON-----

INVESTIGATION NAME- GAMMA-RAY LINE SPECTROMETER

NSSDC ID- HEAO-C -01

INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY
X-RAY ASTRONOMY

PERSONNEL

PI - A.S. JACOBSON
OI - J.R. ARNOLD
OI - A.E. METZGER
OI - L.E. PETERSON

NASA-JPL
U OF CALIF, SAN DIEGO
NASA-JPL
U OF CALIF, SAN DIEGO

BRIEF DESCRIPTION

THE BASIC GOALS OF THIS EXPERIMENT ARE TO SEARCH FOR GAMMA-RAY LINE EMISSIONS ARISING FROM A VARIETY OF SOURCE PHENOMENA. PARTICULAR EMPHASIS IS PLACED ON FINDING LINE EMISSIONS FROM NUCLEOSYNTHESIS PROCESSES IN SUPERNOVAE, AND FROM POSITRON-ELECTRON ANNIHILATION AND NUCLEAR REACTIONS IN LOW-ENERGY COSMIC RAYS. IN ADDITION, CAREFUL STUDY IS MADE OF THE SPECTRA AND TIME VARIATIONS OF KNOWN HARD X-RAY SOURCES. THE EXPERIMENT IS CAPABLE OF MEASURING GAMMA-RAY LINES FALLING WITHIN THE ENERGY INTERVAL FROM 0.06 TO 10 MEV, AND WITH AN ENERGY RESOLUTION BETTER THAN 2.5 KEV AT 1.33 MEV AT A LINE SENSITIVITY FROM 1.E-4 TO 1.E-5 PHOTONS/SQ CM/S, DEPENDING ON THE ENERGY. THE EXPERIMENTAL PACKAGE CONTAINS FOUR COOLED DRIFTED GERMANIUM DETECTORS SHIELDED BY CESIUM IODIDE. THE KEY EXPERIMENTAL PARAMETERS ARE -- (1) GEOMETRY FACTOR OF 11.1 SQ CM-SR, (2) A FIELD OF VIEW OF 27 DEG FWHM AND, (3) A TIME RESOLUTION OF LESS THAN 0.1 MS FOR THE GERMANIUM DETECTOR AND 10 S FOR THE CESIUM IODIDE DETECTOR.

----- HEAO-C, KOCH-----

INVESTIGATION NAME- ISOTOPIC COMPOSITION OF COSMIC RAYS

NSSDC ID- HEAO-C -04

INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS
HIGH ENERGY ASTROPHYSICS

PERSONNEL

PI - L. KOCH
PI - B. PETERS
OI - J.P. MEYER
OI - D. ROUSSEL
OI - A. SOUTOUL
OI - M. CASSE
OI - P. MESTREAU
OI - N. LUND
OI - K. OMO
OI - O. CORYDON-PETERSON

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BRIEF DESCRIPTION

THIS EXPERIMENT MEASURES THE RELATIVE COMPOSITION OF THE ISOTOPES OF THE PRIMARY COSMIC RAYS BETWEEN BERYLLIUM AND IRON (Z FROM 4 TO 26) AND THE ELEMENTAL ABUNDANCES UP TO TIN (Z=50). CERENKOV COUNTERS AND HODOSCOPES TOGETHER WITH THE EARTH'S MAGNETIC FIELD FORM A SPECTROMETER. THEY DETERMINE CHARGE AND MASS OF COSMIC RAYS TO A PRECISION OF 10 PERCENT FOR THE MOST ABUNDANT ELEMENTS OVER THE MOMENTUM RANGE FROM 2 TO 25 GEV/C.

***** IR ASTRON. SAT.*****

SPACECRAFT COMMON NAME- IR ASTRON. SAT.

ALTERNATE NAMES- INFRA-RED ASTRONOM SAT, IRAS

NSSDC ID- IRAS

LAUNCH DATE- 08/00/81 WEIGHT- 1000. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY

THE NETHERLANDS
UNITED STATES
UNITED KINGDOM

NIVR
NASA-OSS
SRC

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 103.1 MIN
PERIAPSIS- 900. KM ALT

INCLINATION- 99. DEG
APOAPSIS- 900. KM ALT

PERSONNEL

MG - L. DONDEY
SC - N.W. BOGGESS
PM - E.K. CASANI
PS - H.H. AUMANN

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-JPL
NASA-JPL

BRIEF DESCRIPTION

THE INFRARED ASTRONOMICAL SATELLITE (IRAS) IS A MISSION WITH JOINT EXECUTION BY THE UNITED STATES (NASA), THE NETHERLANDS, AND THE UNITED KINGDOM. THE BASIC GOAL OF THIS PLANNED 1-YEAR MISSION IS TO OBTAIN A DEEP, FULL-SKY SURVEY OVER THE APPROXIMATE WAVELENGTH RANGE 8-300 MICROMETERS WITH 5 BROAD-BAND PHOTOMETRY CHANNELS. THE IRAS CONTAINS A 0.6-METER RITCHIEY-CRETIEN TELESCOPE COOLED BY HELIUM TO A TEMPERATURE OF NEAR 10 K. AN ARRAY OF ABOUT 100 DETECTORS IS USED TO DETECT THE INFRARED FLUX IN BANDS CENTERED AT 10, 20, 50, AND 100 MICROMETERS. THE SENSITIVITY OF THE INSTRUMENT IS RESTRICTED BY THE PHOTON FLUCTUATIONS FROM THE ZODIACAL LIGHT. THE POSITIONS OF GALACTIC AND EXTRAGALACTIC SOURCES ARE DETERMINED TO AN ACCURACY OF 0.5 ARC MIN. IN ADDITION TO THE FOCAL-PLANE DETECTOR ARRAY USED FOR THE ALL-SKY SURVEY, BOTH A LOW-RESOLUTION SPECTROGRAPHIC AND A LONG-WAVELENGTH (GREATER THAN 100 MICROMETERS) PHOTOMETRIC CAPABILITY ARE INCLUDED ON THE IRAS. THE IRAS IS FLOWN IN A 900-KM ORBIT, WITH AN INCLINATION NEAR 99 DEG. TO EFFECT THE SCANNING OF THE SKY

NEEDED FOR THE SURVEY, THE SATELLITE IS ROTATED AT A CONSTANT ANGULAR VELOCITY AROUND THE SUN VECTOR IN THE DIRECTION OF THE ORBITAL ANGULAR VELOCITY. THE IRAS IS ALSO ABLE TO DO POINTED OBSERVATIONS. HERE THE IRAS CAN BE POINTED AT A SELECTED CELESTIAL OBJECT FOR UP TO 17 MIN. THIS POINTING ABILITY PERMITS VERY SENSITIVE MEASUREMENTS ON THE FAINTER GALACTIC AND EXTRAGALACTIC SOURCES. THE SCIENCE WORKING GROUP IS LISTED IN APPENDIX B.

***** IRM*****

SPACECRAFT COMMON NAME- IRM
ALTERNATE NAMES- ION RELEASE MODULE, AMPTE/ION RELEASE MODULE
NSSDC ID- IRM
LAUNCH DATE- 03/00/83 WEIGHT- 55. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE
SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS
FED REP OF GERMANY MPI
PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 3102.3 MIN INCLINATION- 0. DEG
PERIAPSIS- 200. KM ALT APOAPSIS- 127560. KM ALT
PERSONNEL
PM - U. JONELEIT DFVLR
PM - G.W. OUSLEY NASA-GSFC
PS - G. HAERENDEL MPI-EXTRATERR PHYS

BRIEF DESCRIPTION
THIS SPACECRAFT CARRIES 2 LI AND 1 EU ION RELEASE CANNISTERS ALONG WITH A SUN SENSOR AND 3-AXIS MAGNETOMETER ATTITUDE DETERMINATION SYSTEM. THE POWER SYSTEM CONSISTS OF SOLAR PANELS TO PROVIDE 10 W, AND A BATTERY. THE SPACECRAFT SPIN STABILIZES AT 2.5 RPM. THE THERMAL SYSTEM EMPLOYS ACTIVE HEATERS AND MULTILAYER INSULATION. THE TELEMETRY SYSTEM IS A 0.5 W S-BAND TRANSMITTER. THE SCHOENSTEDT MAGNETOMETER IS SENSITIVE TO FIELDS FROM 0.5 TO 1.004 NT AND IS THE ONLY DETECTION INSTRUMENT ON BOARD. IONS RELEASED ARE TO BE DETECTED BY INSTRUMENTS ON THE CCE SPACECRAFT. THE SCIENTIFIC TEAM IS LISTED IN APPENDIX B.

----- IRM, HAERENDEL-----

INVESTIGATION NAME- LI AND EU RELEASE MODULE
NSSDC ID- IRM -01 INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PERSONNEL
PI - G. HAERENDEL MPI-EXTRATERR PHYS
OI - H. FOPPL MPI-EXTRATERR PHYS
OI - B. HAUSLER MPI-EXTRATERR PHYS
OI - A. VALENZUELA MPI-EXTRATERR PHYS

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTS OF TWO LI AND ONE EU ION RELEASE CANNISTERS. ONE LI RELEASE OF APPROXIMATELY 1.026 ATOMS, OCCURRING OUTSIDE THE MAGNETOSPHERE NEAR THE SUBSOLAR POINT, IS DETECTED INSIDE THE MAGNETOSPHERE BY INSTRUMENTS ON THE CCE SPACECRAFT. THE SECOND LI RELEASE AND THE EU RELEASE ARE WELL INSIDE THE GEOMAGNETIC TAIL.

***** ISPM/ESA*****

SPACECRAFT COMMON NAME- ISPM/ESA
ALTERNATE NAMES- ISPM, ISP
INT SOLAR POLAR, SOLAR POLAR
NSSDC ID- ISPESA
LAUNCH DATE- 02/03/83 WEIGHT- 450. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE
SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESA
PLANNED ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC
ORBIT PERIOD- 2020. DAYS INCLINATION- 70. DEG
PERIAPSIS- 1.0 AU RAD APOAPSIS- 5.24 AU RAD
PERSONNEL
PM - D. EATON ESA-ESTEC
PS - K.P. WENZEL ESA-ESTEC

BRIEF DESCRIPTION

THE PRIMARY OBJECTIVES OF THE INTERNATIONAL SOLAR POLAR MISSION (ISPM) ARE FOR TWO SPACECRAFT TO INVESTIGATE, AS A FUNCTION OF SOLAR LATITUDE, THE PROPERTIES OF THE SOLAR CORONA, THE SOLAR WIND, THE STRUCTURE OF THE SUN-WIND INTERFACE, THE HELIOSPHERIC MAGNETIC FIELD, SOLAR AND NON-SOLAR COSMIC RAYS, SOLAR RADIO BURSTS AND PLASMA WAVES, AND THE INTERSTELLAR/INTERPLANETARY NEUTRAL GAS AND DUST. SECONDARY OBJECTIVES INCLUDE INTERPLANETARY PHYSICS INVESTIGATIONS DURING THE INITIAL EARTH-JUPITER PHASE, WHEN THE SEPARATION OF THE ESA AND THE NASA SPACECRAFT IS APPROXIMATELY 0.01 AU, AND MEASUREMENTS OF THE JOVIAN MAGNETOSPHERE DURING THE JUPITER FLYBY PHASE. THE TWO SPACECRAFT FOR THIS MISSION (ISPM/NASA AND ISPM/ESA) TRAVEL TO JUPITER WITH A CLOSE ENCOUNTER IN MAY 1984, THEN ONE SPACECRAFT IS PLACED INTO A NORTH TRAJECTORY (RELATIVE TO THE SOLAR ECLIPTIC) AND THE OTHER INTO A SOUTH TRAJECTORY. THE JUPITER ENCOUNTER TAKES BOTH SPACECRAFT JUST INSIDE IO'S ORBIT. AFTER JUPITER FLYBY, BOTH SPACECRAFT TRAVEL IN HELIOCENTRIC OUT-OF-ECLIPTIC ORBITS WITH HIGH HELIOGRAPHIC INCLINATION AND PASS OVER THE ROTATIONAL POLES OF THE SUN. BOTH SPACECRAFT ARE LAUNCHED BY A SINGLE SPACE TRANSPORTATION SYSTEM (STS) VEHICLE WITH SEPARATE INERTIAL UPPER STAGE (IUS) UNITS. SPACECRAFT DESIGN IS STILL UNDER STUDY. A JOINT NASA/ESA RADIO SCIENCE TEAM CONDUCTS INDIVIDUAL INVESTIGATIONS IN ADDITION TO THE SEPARATE EXPERIMENTS. THE MISSIONS INCLUDE THEORETICAL AND INTERDISCIPLINARY INVESTIGATIONS. THE SCIENTISTS FOR THESE INVESTIGATIONS ARE LISTED IN APPENDIX B.

----- ISPM/ESA, BAME-----

INVESTIGATION NAME- PLASMA SPECTROMETER
NSSDC ID- ISPESA -05 INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PERSONNEL
PI - S.J. BAME LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION ARE TO: (1) INVESTIGATE AND ESTABLISH BULK FLOW PARAMETER AND INTERNAL STATE VARIATIONS OF THE SOLAR WIND AS A FUNCTION OF SOLAR LATITUDE; (2) INVESTIGATE RADIAL VARIATIONS OF SOLAR WIND PROPERTIES BETWEEN EARTH AND JUPITER; AND (3) INVESTIGATE THE SOLAR WIND INTERACTION WITH THE JOVIAN MAGNETOSPHERE. THE INSTRUMENT CONSISTS OF TWO SENSOR SYSTEMS, ASSOCIATED ELECTRONICS, AND INTERFACES WITH THE SPACECRAFT. ELECTRONS ARE MEASURED BY A 125-DEG SPHERICAL SECTION ELECTROSTATIC ANALYZER WITH 7 CHANNEL ELECTRON MULTIPLIERS (CEM'S) WHICH COVER A POLAR ANGLE RANGE OF 146 DEG. THE ANALYZER IS ENCLOSED IN A LIGHT-TIGHT PACKAGE WITH AN ENTRANCE APERTURE OF 1 CM WIDTH. THE GAP WIDTH IS 0.38 CM AND THE AVERAGE RADIUS OF CURVATURE IS 4.5 CM. THE ANALYZER HAS A GEOMETRIC FACTOR (G) OF 4.7 E-3 SQ CM-SR. THE SOLAR WIND ION ANALYZER MAKES THREE-DIMENSIONAL MEASUREMENTS OF SOLAR WIND IONS WITH ENERGIES IN THE RANGE BETWEEN 257 EV AND 35 KEV PER CHARGE. IT CONSISTS OF A 130-DEG SPHERICAL SECTION ELECTROSTATIC ANALYZER FITTED WITH 17 CEM SENSORS WHICH COVER A POLAR ANGLE RANGE OF 80 DEG. IT IS MOUNTED SO THAT ONE EDGE OF ITS POLAR ANGLE OF ACCEPTANCE IS PARALLEL TO THE SPIN AXIS. A STEPPING MOTOR IS USED TO ROTATE ANY ONE OF SEVEN APERTURES INTO PLACE. THE MASS OF THE ELECTRON INSTRUMENT IS 2.35 KG. IT USES 2 W MEAN AND 3 W PEAK, AND HAS A DATA RATE OF 20 BPS IN CRUISE MODE AND 40 BPS IN TRACKING MODE. THE MASS OF THE ION INSTRUMENT IS 4.62 KG. IT USES 4 W MEAN AND 10 W PEAK, AND HAS A DATA RATE OF 50 BPS IN CRUISE MODE AND 100 BPS IN TRACKING MODE.

----- ISPM/ESA, ESPOSITO-----

INVESTIGATION NAME- RADIO SCIENCE
NSSDC ID- ISPESA -09 INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
SOLAR PHYSICS
PERSONNEL
TL - P.B. ESPOSITO NASA-JPL
TM - H.E. VOLLAND U OF BONN
TM - B. BERTOTTI U OF PAVIA
TM - P.S. CALLAHAN NASA-JPL

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION ARE TO UTILIZE THE ISPM/ESA SPACECRAFT AND THE NASA DEEP SPACE NETWORK FOR DIFFERENT STUDIES CONDUCTED BY INDIVIDUAL MEMBERS OF THE RADIO SCIENCE TEAM. STUDIES INCLUDE THE FOLLOWING: (1) DETERMINE THE CORONAL, INTEGRATED ELECTRON DENSITY, AND THE GLOBAL CORONAL ELECTRON DENSITY AS A FUNCTION OF HELIOCENTRIC RADIAL DISTANCE AND LATITUDE; (2) INVESTIGATE THE MAGNITUDE AND LOCATION OF CHANGES IN THE ELECTRON DENSITY ALONG THE LINE OF SIGHT TO DETERMINE THE STRUCTURE AND TIME HISTORY OF DENSITY FLUCTUATIONS IN THE SOLAR WIND; AND (3) DETERMINE THE VELOCITY OF THE SOLAR WIND CLOSE TO THE SUN, AND DETERMINE THE STRUCTURE OF THE CORONAL ELECTRON DENSITY CLOSE TO THE SUN. IN ADDITION, THERE ARE SEVERAL OTHER INVESTIGATIONS WHICH ARE UNDER STUDY.

----- ISPM/ESA, GLOECKLER-----

INVESTIGATION NAME- SOLAR-WIND COMPOSITION SPECTROMETER

NSSDC ID- ISPESA -04

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - G. GLOECKLER
OI - J. GEISS

U OF MARYLAND
U OF BERNE

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO STUDY THE ELEMENTAL AND IONIC-CHARGE COMPOSITION AND THE TEMPERATURES AND MEAN SPEEDS OF ALL MAJOR SOLAR WIND IONS FROM H THROUGH FE. THE INSTRUMENT CONSISTS OF A DEFLECTION ASSEMBLY, HIGH VOLTAGE BUBBLE CONTAINING ANALOG ELECTRONICS, A POST-ACCELERATION 30 KV SUPPLY, A POINTING DEVICE, AND ELECTRONICS FOR DATA PROCESSING AND POWER CONVERSION. THE INSTRUMENT HAS A MASS OF 4.5 KG, USES 3.6 W MEAN AND 11.6 W PEAK POWER, AND HAS A DATA RATE OF 43 BPS IN CRUISE MODE AND 86 BPS IN TRACKING MODE.

----- ISPM/ESA, GRUN-----

INVESTIGATION NAME- COSMIC DUST

NSSDC ID- ISPESA -07

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
DUST

PERSONNEL

PI - E. GRUN

MPI-NUCLEAR PHYS

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO INVESTIGATE PARTICULATE MATTER WITH MASSES BETWEEN $1.E-16$ G AND $1.E-7$ G IN THE HELIOSPHERE; DETERMINE ITS PHYSICAL AND DYNAMICAL PROPERTIES AS A FUNCTION OF ECLIPTIC LATITUDE AND HELIOCENTRIC DISTANCE; AND INVESTIGATE ITS INTERACTION WITH OTHER INTERPLANETARY/INTERSTELLAR PHENOMENA SUCH AS SOLAR RADIATION, SOLAR WIND, HELIOSPHERIC MAGNETIC FIELD, AND INTERSTELLAR NEUTRAL GAS. THIS INSTRUMENT COMPRISES A SENSOR WITH CHANNELTRON AND ASSOCIATED ELECTRONICS SUCH AS PREAMPLIFIERS, SIGNAL CONDITIONERS, AND SPACECRAFT INTERFACE UNITS. THE INSTRUMENT HAS A MASS OF 2.7 KG AND USES 1.5 W OF POWER. THE DATA RATE IS 3 BPS.

----- ISPM/ESA, HEDGECOCK-----

INVESTIGATION NAME- MAGNETIC FIELD

NSSDC ID- ISPESA -08

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS

PERSONNEL

PI - P.C. HEDGECOCK

IMPERIAL COLLEGE

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO INVESTIGATE THE STRENGTH AND GEOMETRY OF THE INTERPLANETARY MAGNETIC FIELD IN THE INNER HELIOSPHERE (PARTICULARLY AT HIGH SOLAR LATITUDES) AND TO INVESTIGATE THE HELIOGRAPHIC LATITUDE DEPENDENCE OF THE FIELD FLUCTUATION SPECTRA WITH SPECIAL EMPHASIS ON THE FREQUENCY RANGE BELOW 0.01 HZ. SECONDARY OBJECTIVES WERE TO STUDY THE INTERNAL DYNAMICS OF THE SOLAR WIND; THE ROLE OF DISCONTINUITIES AND WAVES IN THE INTERPLANETARY FIELD ON PROPAGATION AND ACCELERATION OF ENERGETIC PARTICLES; THE INTERPLANETARY PROPAGATION AND DEVELOPMENT OF DISCONTINUITIES AND WAVES; AND THE STRUCTURE AND DYNAMICS OF THE DUSK REGION OF THE JOVIAN MAGNETOSPHERE. THE INSTRUMENT CONSISTS OF A TRIAXIAL FLUXGATE MAGNETOMETER, A VECTOR HELIUM MAGNETOMETER, A BOOM, AND ASSOCIATED ELECTRONICS. THE INSTRUMENT HAS A MASS OF 4.58 KG EXCLUDING THE BOOM. IT HAS A DATA RATE OF 40 BPS IN THE CRUISE MODE AND 80 BPS IN THE TRACKING MODE. IT USES 5.22 W OF POWER.

----- ISPM/ESA, HURLEY-----

INVESTIGATION NAME- SOLAR-FLARE X-RAYS AND COSMIC GAMMA RAY BURST

NSSDC ID- ISPESA -01

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - K.C. HURLEY
OI - M.K. SOMMER

CESR
MPI-EXTRATERR PHYS

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO STUDY THE ACCELERATION AND STORAGE OF ENERGETIC ELECTRONS ACCELERATED DURING SOLAR FLARES BY MEASURING SOLAR X-RADIATION; TO IDENTIFY GAMMA-RAY BURST SOURCES WITH KNOWN CELESTIAL OBJECTS OR PHENOMENA; AND TO STUDY PLASMA AND ENERGETIC CHARGED PARTICLE PROCESSES IN THE JOVIAN MAGNETOSPHERE. THIS INVESTIGATION IS SIMILAR TO THE NASA EXPERIMENT ISPM/NASA-02 (CLINE). THE INSTRUMENT CONSISTS OF TWO HEMISPHERICAL CESIUM IODIDE (SODIUM) CRYSTALS COUPLED TO TWO CURVED CATHODE PHOTOMULTIPLIERS; TWO SMALL SOLID-STATE DETECTORS CLOSE TO THE TWO CRYSTALS, WITH AN AMERICIUM 241 RADIOACTIVE SOURCE DEPOSITED ON THE SURFACES OF THE SOLID-STATE DETECTORS; ONE PROPORTIONAL COUNTER; AND A DIGITAL ELECTRONICS UNIT. THE SCINTILLATION COUNTERS MEASURE X RAYS IN THE ENERGY RANGE FROM 15 KEV TO 150 KEV, WHILE THE PROPORTIONAL COUNTER MEASURES X RAYS FROM 5 KEV TO 15 KEV. THE SOLID-STATE DETECTORS ARE USED TO CALIBRATE THE SCINTILLATORS. IN ADDITION THEY ACT AS BACKUP DETECTORS IN CASE OF A SCINTILLATION COUNTER FAILURE. THE INSTRUMENT HAS A MASS OF 11.17 KG, USES 11.2 W MEAN AND 11.7 W PEAK POWER, AND HAS A DATA RATE OF 80 BPS IN CRUISE MODE AND 160BPS IN TRACKING MODE.

----- ISPM/ESA, LANZEROTTI-----

INVESTIGATION NAME- HELIOSPHERE

NSSDC ID- ISPESA -03

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS

PERSONNEL

PI - L.J. LANZEROTTI

BELL TELEPHONE LAB

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO: (1) INVESTIGATE THE SOLAR FLARE PROCESS WITH MEASUREMENTS OF NON-RELATIVISTIC AND RELATIVISTIC ELECTRONS, AND NON-RELATIVISTIC IONS, AND THEIR DEPENDENCE ON HELIOLATITUDE; (2) INVESTIGATE SOLAR ELEMENTAL ABUNDANCES WITH MEASUREMENTS OF CHEMICAL AND ISOTOPIC COMPOSITION OF NUCLEI OF SOLAR ORIGIN AT ALL HELIOLATITUDES; (3) INVESTIGATE THE INTERPLANETARY PROPAGATION OF SOLAR ENERGETIC PARTICLES BY MEASUREMENT OF ANISOTROPY AND COMPOSITION PARAMETERS; (4) INVESTIGATE ACCELERATION PROCESSES; AND (5) INVESTIGATE TEMPORAL AND SPATIAL VARIATIONS OF PARTICLE INTENSITY IN AND NEAR THE JOVIAN MAGNETOSPHERE. THE INSTRUMENTATION CONSISTS OF THREE SENSORS. THE PRIMARY DETECTOR MEASURES PROTONS AND IONS AT LOW ENERGIES (.GT. 20 KEV) WITH A GEOMETRY FACTOR (G) OF APPROXIMATELY 0.5 SQ CM-SR. A RARE EARTH ALLOY MAGNET DEFLECTS ELECTRONS WITH ENERGIES .LT. 400 KEV AWAY FROM THE PRIMARY DETECTOR TO SENSOR 2. THE OUTPUT IS FED INTO WINDOW-TYPE DISCRIMINATORS WHICH PROVIDE 7 PROTON-ION DIFFERENTIAL ENERGY CHANNELS IN THE RANGE FROM 0.02 MEV TO 5.0 MEV. THE OUTPUT IS ALSO PULSE HEIGHT ANALYZED IN SECTORS. SENSOR 2 PROVIDES UNIQUE IDENTIFICATION OF LOW ENERGY (.GT. 15 KEV) ELECTRONS, WITH A G APPROXIMATELY EQUAL TO 0.05 SQ CM-SR. FOUR DIFFERENTIAL ENERGY CHANNELS PROVIDE OUTPUTS OVER THE 15 KEV TO 240 KEV ENERGY RANGE. SENSOR 3 IS BEHIND A NICKEL-FOIL SHIELD, WITH A VIEW DIRECTION OPPOSITE TO SENSOR 2. THE FOIL STOPS PROTONS UP TO APPROXIMATELY 0.3 MEV, BUT ALLOWS PENETRATION OF LOW-ENERGY ELECTRONS. ELECTRONS ARE DETECTED FROM 30 KEV TO 480 KEV, PROTONS FROM 0.48 MEV TO 5.0 MEV. THE INSTRUMENT HAS A MASS OF 3.7 KG, A 4 W POWER USAGE, AND A DATA RATE OF 88 BPS IN CRUISE MODE AND 176 BPS IN TRACKING MODE.

----- ISPM/ESA, SIMPSON-----

INVESTIGATION NAME- COSMIC RAY AND CHARGED PARTICLE

NSSDC ID- ISPESA -02

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - J.A. SIMPSON

U OF CHICAGO

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO STUDY THE ENERGY, CHARGE, AND MASS SPECTRA OF ENERGETIC CHARGED PARTICLES IN INTERPLANETARY SPACE IN THE ENERGY RANGE FROM APPROXIMATELY 0.5 MEV/NUCLEON (FOR PROTONS) TO APPROXIMATELY 100 MEV/NUCLEON; AND TO STUDY SPATIAL GRADIENTS AND THE PROPAGATION OF CHARGED PARTICLES THROUGHOUT THE HELIOSPHERE BY MEASURING ABSOLUTE FLUX AND VECTOR ANISOTROPY. THE INSTRUMENT CONSISTS OF SIX CHARGED PARTICLE TELESCOPES (CPT) AND ASSOCIATED ELECTRONICS. THE HIGH ENERGY TELESCOPE PROVIDES MEASUREMENTS OF THE CHEMICAL AND ISOTOPIC COMPOSITION AND OF THE ENERGY SPECTRUM OF THE COSMIC RADIATION ABOVE APPROXIMATELY 10 MEV/NUCLEON. THE LOW ENERGY TELESCOPE (LET) EXTENDS CHEMICAL COMPOSITION AND SPECTRAL MEASUREMENTS DOWNWARDS TO .LE. 1 MEV/NUCLEON. THE ANISOTROPY TELESCOPES, IN CONJUNCTION WITH THE LET, PROVIDE A MEANS OF DETERMINING THE DISTRIBUTION OF ARRIVAL DIRECTIONS IN THREE DIMENSIONS OF LOW ENERGY PROTONS AND HE NUCLEI. THE HIGH FLUX TELESCOPE PROVIDES MEASUREMENTS OF THE INTENSITY AND ARRIVAL DIRECTION OF PROTONS, HELIUM, CNO, AND FE GROUP NUCLEI IN HIGH FLUX ENVIRONMENTS, SUCH AS INTENSE SOLAR FLARES OR JUPITER'S MAGNETOSPHERE, WHERE THE OTHER SENSOR SYSTEMS MAY BECOME SATURATED. EACH CPT PROVIDES OUTPUT TO A DATA PROCESSING UNIT

(DPU). THE ELECTRON TELESCOPE CONSISTS OF A ONE DOUBLE CERENKOV AND SEMICONDUCTOR DETECTOR TELESCOPE WHICH INTERFACE WITH THE DPU. THE INSTRUMENT HAS A MASS OF 11.17 KG AND USES 11.2 W MEAN AND 11.7 W PEAK POWER. THE DATA RATE IS 80 BPS IN CRUISE MODE AND 160 BPS IN TRACKING MODE.

----- ISPM/ESA, STONE-----

INVESTIGATION NAME- UNIFIED RADIO AND PLASMA WAVE

NSSDC ID- ISPESA -06 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS

PERSONNEL
PI - R.G. STONE NASA-GSFC

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO: (1) INVESTIGATE SOURCE POSITIONS OF TRAVELLING SOLAR RADIO BURSTS IN THE RANGE FROM DC TO 1 MHZ; (2) INVESTIGATE THE LARGE-SCALE MAGNETIC FIELD TOPOLOGY AND THE ELECTRON DENSITY ALONG THE EXCITER TRAJECTORY AS A FUNCTION OF HELIOGRAPHIC LATITUDE AND LONGITUDE AT DISTANCES OF 0.1 AU TO APPROXIMATELY 5 AU; (3) INVESTIGATE JOVIAN RADIO SOURCE LOCATIONS IN THE RANGE FROM DC TO 1 MHZ; AND (4) INVESTIGATE WAVES IN THE PLASMA BETWEEN DC AND 30 KHZ, THEIR INSTABILITIES, THEIR ENERGY TRANSPORT MECHANISMS, AND THE THERMAL ELECTRON DENSITY. THIS INVESTIGATION OPERATES IN CONJUNCTION WITH THE SIMILAR INVESTIGATION ISPM/NASA-05 (STONE). THE INSTRUMENT COMPRISES THREE ANTENNA SYSTEMS (A 70-M TIP-TO-TIP DIPOLE IN THE EQUATORIAL PLANE, A MONOPOLE ALONG THE SPIN AXIS, AND A PAIR OF CROSSED-AXIS MAGNETIC SEARCH COILS LOCATED IN THE EQUATORIAL PLANE) AND FOUR RECEIVER SYSTEMS (AN RF RECEIVER FOR 5 KHZ TO 1 MHZ IN TWO INTERVALS FROM 5 TO 30 KHZ AND FROM 30 KHZ TO 1 MHZ; A PLASMA FREQUENCY RECEIVER COVERING FROM 0.8 KHZ TO 30 KHZ IN 32 CONTIGUOUS INTERVALS; A FAST ENVELOPE SAMPLER 0.2 KHZ TO 60 KHZ WITH FOUR COMMANDABLE DECADE RANGES TO CAPTURE TRANSIENT EVENTS; AND A WAVE FORM ANALYZER, DC TO 1 KHZ, THAT OPERATES IN TWO FREQUENCY BANDS, FROM DC TO 10 HZ AND FROM 10 HZ TO 1 KHZ). THE INSTRUMENT HAS A MASS OF 6.86 KG, EXCLUDING ANTENNAS AND BOOMS, AND HAS A DATA RATE OF 116 BPS. IT USES 8.22 W OF POWER.

***** ISPM/NASA*****

SPACECRAFT COMMON NAME- ISPM/NASA
ALTERNATE NAMES- ISPM, ISP
INT SOLAR POLAR, SOLAR POLAR

NSSDC ID- ISPNASA

LAUNCH DATE- 02/03/83 WEIGHT- 450. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC
ORBIT PERIOD- 2020. DAYS
PERIAPSIS- 1.0 AU RAD INCLINATION- 70. DEG
APOAPSIS- 5.24 AU RAD

PERSONNEL
MG - D.R. BURROWBRIDGE, JR. NASA HEADQUARTERS
PM - H.W. NORRIS NASA-JPL

BRIEF DESCRIPTION

THE PRIMARY OBJECTIVES OF THE INTERNATIONAL SOLAR POLAR MISSION (ISPM) ARE FOR TWO SPACECRAFT TO INVESTIGATE, AS A FUNCTION OF SOLAR LATITUDE, THE PROPERTIES OF THE SOLAR CORONA, THE SOLAR WIND, THE STRUCTURE OF THE SUN-WIND INTERFACE, THE HELIOSPHERIC MAGNETIC FIELD, SOLAR AND NON-SOLAR COSMIC RAYS, SOLAR RADIO BURSTS AND PLASMA WAVES, AND THE INTERSTELLAR/INTERPLANETARY NEUTRAL GAS AND DUST. SECONDARY OBJECTIVES INCLUDE INTERPLANETARY PHYSICS INVESTIGATIONS DURING THE INITIAL EARTH-JUPITER PHASE, WHEN THE SEPARATION OF THE ESA AND THE NASA SPACECRAFT IS APPROXIMATELY 0.01 AU, AND MEASUREMENTS OF THE JOVIAN MAGNETOSPHERE DURING THE JUPITER FLYBY PHASE. THE TWO SPACECRAFT FOR THIS MISSION (ISPM/NASA AND ISPM/ESA) TRAVEL TO JUPITER WITH A CLOSE ENCOUNTER IN MAY 1984, THEN ONE SPACECRAFT IS PLACED INTO A NORTH TRAJECTORY (RELATIVE TO THE SOLAR ECLIPTIC) AND THE OTHER INTO A SOUTH TRAJECTORY. THE JUPITER ENCOUNTER TAKES BOTH SPACECRAFT JUST INSIDE IO'S ORBIT. AFTER JUPITER FLYBY, BOTH SPACECRAFT TRAVEL IN HELIOCENTRIC OUT-OF-ECLIPTIC ORBITS WITH HIGH HELIOGRAPHIC INCLINATION AND PASS OVER THE ROTATIONAL POLES OF THE SUN. BOTH SPACECRAFT ARE LAUNCHED BY A SINGLE SPACE TRANSPORTATION SYSTEM (STS) VEHICLE WITH SEPARATE INERTIAL UPPER STAGE (IUS) UNITS. SPACECRAFT DESIGN IS STILL UNDER STUDY. A JOINT NASA/ESA RADIO SCIENCE TEAM CONDUCTS INDIVIDUAL INVESTIGATIONS IN ADDITION TO THE SEPARATE EXPERIMENTS. THE MISSIONS INCLUDE THEORETICAL AND INTERDISCIPLINARY INVESTIGATIONS. THE SCIENTISTS FOR THESE INVESTIGATIONS ARE LISTED IN APPENDIX B.

----- ISPM/NASA, ACUNA-----

INVESTIGATION NAME- MAGNETIC FIELD (MAG)

NSSDC ID- ISPNASA-06 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - M.H. ACUNA NASA-GSFC

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION (MAG) IS TO MEASURE THE JOVIAN AND INTERPLANETARY VECTOR MAGNETIC FIELD TO INVESTIGATE THE LARGE-SCALE THREE-DIMENSIONAL STRUCTURE OF THE HELIOSPHERIC FIELD, ITS SOLAR ORIGIN, AND ITS SMALL-SCALE CHARACTERISTICS. THE MAG HAS A TIME RESOLUTION OF UP TO 20 VECTORS/S, A PRECISION OF 0.025 PERCENT, AN ACCURACY OF 0.12 NT, A SENSITIVITY OF 0.004 NT, AND A DYNAMIC RANGE OF PLUS OR MINUS 4,096 NT. MAG USES A TRIAXIAL FLUXGATE MAGNETOMETER MOUNTED NEAR THE TIP OF A BOOM WITH AN INBOARD SENSOR MOUNTED ABOUT HALFWAY TO TWO-THIRDS ALONG THE BOOM LENGTH. NORMAL DATA MODE IS 1 VECTOR/S WITH AN AUTOMATIC SWITCH TO 20 VECTOR/S BASED ON THE CHARACTERISTICS OF DATA OBSERVED IN THE PRECEDING PERIOD OF TIME. THE INSTRUMENT HAS A MASS OF 3.12 KG, USES 1.5 W OF POWER, AND HAS A BIT RATE OF 11 TO 220 BPS IN CRUISE MODE AND 26 TO 520 BPS IN TRACKING MODE. 20 VECTOR DATA ARE STORED FOR LATER (SLOWER) TRANSMISSION.

----- ISPM/NASA, CLINE-----

INVESTIGATION NAME- SOLAR X-RAY FLARE AND COSMIC-RAY BURST
(SXR)

NSSDC ID- ISPNASA-02 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - T.L. CLINE NASA-GSFC

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION (SXR) ARE TO STUDY THE ACCELERATION, STORAGE AND ESCAPE PROCESSES OF ENERGETIC ELECTRONS IN SOLAR FLARES, TO IDENTIFY THE SOURCE OBJECTS OF COSMIC GAMMA-RAY BURST AND TO SEARCH FOR JOVIAL X-RAYS. THIS INVESTIGATION IS SIMILAR TO THE ESA EXPERIMENT ISPM/ESA-01 (HURLEY). THE INVESTIGATION USES TWO HEMISPHERICAL SCINTILLATION SHELLS MOUNTED ON TWO PHOTOMULTIPLIER TUBES THAT PROVIDE INPUT TO A PROPORTIONAL COUNTER FOR LOWER ENERGY SENSITIVITY. THE GAIN, TRIGGER COMPARATOR, CALIBRATION TRIGGER, AND A FOUR-LEVEL SPECTRAL ANALYZER ARE COMMANDABLE. THE INSTRUMENT HAS A MASS OF 1.4 KG, USES 1.2 W OF POWER, AND HAS A DATA RATE OF 12 BPS.

----- ISPM/NASA, GIESE-----

INVESTIGATION NAME- ZODIACAL LIGHT/BACKGROUND STARLIGHT
(ZLE)

NSSDC ID- ISPNASA-08 INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - R.H. GIESE RUHR-U BOCHUM

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION (ZLE) ARE TO STUDY THE MULTICOLOR (INCLUDING UV) BRIGHTNESS AND POLARIZATION OF REMOTE LIGHT SOURCES (INTEGRATED STARLIGHT, DIFFUSE GALACTIC LIGHT) AND OF THE LIGHT SCATTERED BY THE INTERPLANETARY DUST CLOUD AS A FUNCTION OF ECLIPTIC LATITUDE AND HELIOCENTRIC DISTANCE. THE ZLE USES A SENSOR WITH A STRAY LIGHT Baffle AND ELECTRONICS. THE SENSOR CONSISTS OF OPTICS, A BEAMSPLITTER, AND 2 PHOTOMULTIPLIER TUBES AS DETECTORS. INTERFERENCE FILTERS IN EACH CHANNEL PROVIDE SPECTRAL INFORMATION IN UP TO 8 CHANNELS. THERE ARE POLARIZATION WHEELS IN EACH LIGHT PATH WITH FOUR SETTINGS. THE INSTRUMENT DIVIDES THE SKY INTO EITHER 32 OR 64 EQUAL SECTORS FOR MEASURING ANGULAR DISTRIBUTION, AND DATA IS INTEGRATED OVER 25 TO 250 REVOLUTIONS. THE INSTRUMENT HAS A MASS OF 6.0 KG WITH A DATA RATE OF 36 TO 50 BPS IN CRUISE MODE.

----- ISPM/NASA, MACQUEEN-----

INVESTIGATION NAME- WHITE-LIGHT CORONAGRAPH/X-RAY XUV
TELESCOPE (CXX)

NSSDC ID- ISPNASA-01 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - R.M. MACQUEEN

HIGH ALTITUDE OBS.

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION (CXX) ARE TO IMAGE THE SOLAR ATMOSPHERE FROM THE CHROMOSPHERE TO THE OUTER CORONA OVER A WIDE RANGE OF ALTITUDES AND SOLAR LATITUDES, OBTAIN THREE-DIMENSIONAL STRUCTURE OF THE SOLAR CORONA, INVESTIGATE THE CORONAL INFLUENCE ON THE SOLAR WIND, AND INVESTIGATE THE RELATION BETWEEN THE CORONA AND UNDERLYING PHENOMENA. THE CORONOGRAPH USES A FOUR-FILTER POSITION WHEEL WITH THREE POLARIZATION FILTERS AND ONE OPEN POSITION. THE INSTRUMENT HAS A 430 TO 650 NM SPECTRAL SENSITIVITY WITH A 10- TO 20-ARC-S RESOLUTION. THE FULL DUTY CYCLE IS FOUR PICTURES, EACH 800 BY 800 PIXELS. THE X-RAY XUV TELESCOPE IS A WOLTER TYPE I GRAZING INCIDENCE SYSTEM WITH 12 FILTER POSITIONS. THE SPECTRAL SENSITIVITY IS FROM 0.3 TO 6 NM AND 17.1 TO 55 NM WITH A 4-ARC/S RESOLUTION. EACH IMAGE IS 800 BY 800 PIXELS. THERE ARE NINE BANDPASS FILTERS. THE INSTRUMENT HAS A MASS OF 8.1 KG AND USES 4.0 W CONTINUOUS WITH 5.5 W AT PEAK. THE DATA RETURN RATE IS 1.6 E7 BITS PER DAY NOMINAL TO 6.4 E7 BITS PER DAY.

----- ISPM/NASA, ROSENBAUER-----

INVESTIGATION NAME- MASS SEPARATING SOLAR WIND (SWE)

NSSDC ID- ISPNASA-04

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - H.R. ROSENBAUER

MPI-AERONOMY

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION (SWE) IS TO STUDY SOLAR WIND PHENOMENOLOGY IN THREE DIMENSIONS BY MEASURING ION AND ELECTRON VELOCITY, ANGLES, AND MASS PER CHARGE. IT USES TWO SEPARABLE SENSOR SYSTEMS; AN ION MASS/CHARGE SPECTROMETER WITH A MECHANICAL STEPPING OF THE FOV, 11 DETECTORS, AND A RESOLUTION OF VELOCITY AND MASS/CHARGE OF ABOUT 20 PERCENT; AND AN ELECTROSTATIC ANALYZER WITH AN ENERGY THRESHOLD OF 0.5 EV, 7 DETECTORS, AND MEASUREMENTS IN 64 BANDS BETWEEN 8 EV AND 1600 EV. THE INSTRUMENT HAS A MASS OF 6.05 KG, USES 3.0 W OF POWER, AND HAS A BIT RATE OF 50 BPS DURING CRUISE MODE AND 500 TO 1000 BPS DURING TRACKING MODE.

----- ISPM/NASA, ROSENBAUER-----

INVESTIGATION NAME- DIRECT MEASUREMENT OF INTERSTELLAR GAS
USING HE AS TRACER (NGM)

NSSDC ID- ISPNASA-07

INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - H.R. ROSENBAUER

MPI-AERONOMY

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION (NGM) ARE TO STUDY THE TEMPERATURE, BULK VELOCITY, AND DENSITY OF INTERSTELLAR GAS IN THE VICINITY OF THE SOLAR SYSTEM. THE INVESTIGATION USES AN ELECTRON MULTIPLIER CHANNELTRON TO AMPLIFY AND COUNT SECONDARY ELECTRONS PRODUCED BY A LITHIUM FLUORIDE (LIF) PLANE SURFACE WHICH IS HEATED TO EVAPORATE AND PROVIDE FRESH LAYERS OF LIF AT INTERVALS. THIS SURFACE ALSO DETECTS HE ATOMS. A MECHANICAL COLLIMATOR SUPPRESSES CHARGED PARTICLES AND PHOTOELECTRONS. A STEPPING MOTOR PROVIDES AUTOMATIC SCANNING. THE INSTRUMENT USES 0.51 W STEADY AND 1.5 W PEAK POWER. THE BIT RATE IS 1 TO 2 BPS.

----- ISPM/NASA, STONE-----

INVESTIGATION NAME- COMPREHENSIVE PARTICLE ANALYSIS SYSTEM
(CPA)

NSSDC ID- ISPNASA-03

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - E.C. STONE

CALIF INST OF TECH

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION (CPA) IS TO MEASURE ELEMENTAL COMPOSITION, ENERGY SPECTRA, AND ANGULAR DISTRIBUTIONS OF PARTICLES. THE PARTICLE ENERGY RANGE IS 40 KEV/NUCLEON THROUGH 400 MEV/NUCLEON. THE ISOTOPIC COMPOSITION IS MEASURED OVER THE ENERGY LEVELS 0.1 MEV/NUCLEON THROUGH 64 MEV/NUCLEON FOR H AND HE, 13 MEV/NUCLEON THROUGH 400 MEV/NUCLEON FOR FE, AND 30 KEV TO 120 MEV FOR ELECTRONS. OTHER OBJECTIVES ARE: (1) STUDY SPECTRAL DIFFERENCES AND STREAMING PATTERNS AT HIGH SOLAR LATITUDES; (2) INVESTIGATE THE ORIGIN OF THE LOW-ENERGY COSMIC RAY COMPONENT; (3) STUDY LATITUDE-DEPENDENT ACCELERATION MECHANISMS; (4) STUDY HELIOSPHERIC PROPAGATION OF JOVIAL ELECTRONS; AND (5) STUDY THE ORIGIN, ACCELERATION, AND BEHAVIOR OF ENERGETIC PARTICLES IN

THE JOVIAN MAGNETOSPHERE. FIVE SENSOR SYSTEMS MOUNTED AS A SINGLE UNIT ARE USED. THEY ARE A MASS SPECTROMETER TELESCOPE, A PROTON-ELECTRON TELESCOPE, A LOW-ENERGY ION TELESCOPE, A SOLAR ELECTRON AND PROTON SYSTEM, AND A SUPRATHERMAL ENERGETIC PARTICLE SYSTEM. THE INSTRUMENT PACKAGE HAS A MASS OF 11.7 KG, USES 8.83 W POWER, AND HAS A BIT RATE OF 180 BPS IN CRUISE MODE AND 360 BPS IN TRACKING MODE.

----- ISPM/NASA, STONE-----

INVESTIGATION NAME- ELECTROMAGNETIC SURVEY AND UNIFIED RADIO
AND PLASMA WAVE (RAE)

NSSDC ID- ISPNASA-05

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS

PERSONNEL

PI - R.G. STONE

NASA-GSFC

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION (RAE) ARE TO TRACK SOLAR RADIO BURSTS USING TRIANGULATION TO DETERMINE SOURCE LOCATION, MONITOR LARGE SCALE MAGNETIC FIELD TOPOLOGY AND ELECTRON DENSITY ALONG EXCITER TRAJECTORY AS A FUNCTION OF HELIOGRAPHIC LATITUDE AND LONGITUDE, AND TO DETERMINE JOVIAN RADIO SOURCE LOCATIONS. DATA ARE USED IN CONJUNCTION WITH ISPM/ESA-06 (ALSO STONE). THE INVESTIGATION USES A 100-M TIP-TO-TIP DIPOLE ANTENNA MOUNTED IN THE EQUATORIAL PLANE OF THE SPINNING SECTION AND ASSOCIATED ELECTRONICS. THE RF RECEIVER HAS A LOW PASS BAND OF 5 TO 30 KHZ AND A HIGH PASS BAND OF 30KHZ TO 1 MHZ. IT SAMPLES IN 16 CHANNELS. THE MASS OF THE INSTRUMENT IS 1.68 KG (EXCLUDING THE ANTENNA), POWER CONSUMPTION IS 1.86 W, AND THE DATA RATE IS 21.33 BPS.

***** LANDSAT-D*****

SPACECRAFT COMMON NAME- LANDSAT-D
ALTERNATE NAMES- LAND SATELLITE-D1, LFO-A
LANDSAT-D1

NSSDC ID- LAND-D

LAUNCH DATE- 09/00/81 WEIGHT- 1407. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSTA

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 99.3 MIN INCLINATION- 98.2 DEG
PERIAPSIS- 705. KM ALT APOAPSIS- 705. KM ALT

PERSONNEL

MG - H. MANNHEIMER
SC - J.R. MORRISON
PM - C.M. MACKENZIE
PS - V.V. SALOMONSON

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE LANDSAT-D SYSTEM IS AN EXPERIMENTAL EARTH RESOURCES MONITORING SYSTEM WITH THE NEW POWERFUL REMOTE SENSING CAPABILITIES OF THE THEMATIC MAPPER. IT HAS A COMPLETE END-TO-END HIGHLY AUTOMATED DATA SYSTEM, WHICH IS DESIGNED TO BE A NEW GENERATION SYSTEM, AND IS A MAJOR STEP FORWARD IN GLOBAL REMOTE-SENSING APPLICATIONS. THE LANDSAT-D MISSION CONSISTS OF AN ORBITING SATELLITE (SPACE SEGMENT) WITH THE NECESSARY WIDEBAND DATA LINKS AND SUPPORT SYSTEMS, AND A GROUND SEGMENT. THE LANDSAT-D SPACE SEGMENT CONSISTS OF TWO MAJOR SYSTEMS: (1) THE INSTRUMENT MODULE, CONTAINING THE INSTRUMENT TOGETHER WITH THE MISSION UNIQUE SUBSYSTEMS, SUCH AS THE SOLAR ARRAY AND DRIVE, THE TORS ANTENNA, THE WIDE-BAND MODULE (WBM), AND THE GLOBAL POSITIONING SYSTEM (GPS); AND (2) THE MULTIMISSION MODULAR SPACECRAFT (HMS) THAT CONTAINS THE MODULARIZED AND STANDARDIZED POWER, PROPULSION, ATTITUDE CONTROL, AND COMMUNICATIONS AND DATA HANDLING SUBSYSTEMS. WHEN THE LANDSAT-D SATELLITE IS LAUNCHED, IT IS DEPLOYED AT AN ORBITAL ALTITUDE OF 705.3 KM, INCLINATION OF 98.2 DEG, AND A SUN ANGLE OF 9:30 A.M. AT THE DESCENDING NODE. THIS ORBIT HAS A FREQUENCY OF 19-9/16 ORBITS PER DAY AND COVERS THE EARTH IN 16 DAYS. THE DISTANCE BETWEEN GROUND TRACKS IS 172 KM, WHICH WHEN USED IN CONJUNCTION WITH THE 185-KM SENSORS SWATH WIDTH, PROVIDES AN OVERLAP OF 7.6 PERCENT. THE SPACE SEGMENT IS DESIGNED WITH 3 YEARS NOMINAL LIFE TIME IN ORBIT AND CAN BE EXTENDED THROUGH IN-ORBIT REPLACEMENT CAPABILITY WHEN THE SHUTTLE IS OPERATIONAL.

----- LANDSAT-D, RANGO-----

INVESTIGATION NAME- THEMATIC MAPPER

NSSDC ID- LAND-D -01

INVESTIGATIVE PROGRAM
CODE ER

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

PERSONNEL

PI - A. RANGO NASA-GSFC

BRIEF DESCRIPTION

THE THEMATIC MAPPER (TM) IS A SIX-BAND, EARTH-LOOKING, SCANNING RADIOMETER WITH A 30-M GROUND ELEMENT RESOLUTION COVERING A 185-KM GROUND SWATH FROM A 705-KM ALTITUDE. THE INSTRUMENT CONSISTS OF PRIMARY IMAGING OPTICS, SCANNING MECHANISM, SPECTRAL BAND DISCRIMINATION OPTICS, DETECTOR ARRAYS, RADIATIVE COOLER, IN-FLIGHT CALIBRATOR, AND REQUIRED OPERATING AND PROCESSING ELECTRONICS. THE SCANNING MECHANISM PROVIDES THE CROSS-TRACK SCAN WHILE THE PROGRESS OF THE SPACECRAFT PROVIDES THE SCAN ALONG THE TRACK. THE OPTICAL SYSTEM IMAGES THE EARTH'S SURFACE ON A FIELD STOP OR A DETECTOR SIZED TO DEFINE AN AREA ON THE EARTH'S SURFACE 30 M SQ. SEVERAL LINES ARE SCANNED SIMULTANEOUSLY TO PERMIT SUITABLE DWELL TIME FOR EACH RESOLUTION ELEMENT. THE VARIATION IN RADIANT FLUX PASSING THROUGH THE FIELD STOP ONTO THE PHOTO AND THERMAL DETECTORS CREATES AN ELECTRICAL OUTPUT THAT REPRESENTS THE RADIANT HISTORY OF THE LINE. SIX SPECTRAL BANDS ARE USED TO PROVIDE THE SPECTRAL SIGNATURE CAPABILITY OF THE INSTRUMENT. THE INFORMATION OUTPUTS FROM THE DETECTOR CHANNELS ARE PROCESSED IN THE TM MULTIPLEXER FOR TRANSMISSION VIA THE TRACKING AND DATA RELAY SATELLITES (TDRS) AND/OR DIRECT READOUT TO LOCAL RECEIVING STATIONS.

***** MAGSAT*****

SPACECRAFT COMMON NAME- MAGSAT
ALTERNATE NAMES- AEM-C, GLOBAL MAGNETIC SURV MSN
MAGSAT-A

NSSDC ID- AEM-C

LAUNCH DATE- 10/18/79 WEIGHT- 158. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSTA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 93.7 MIN INCLINATION- 96. DEG
PERIAPSIS- 325. KM ALT APOAPSIS- 550. KM ALT

PERSONNEL

MG - D.S. DILLER NASA HEADQUARTERS
SC - J.P. MURPHY NASA HEADQUARTERS
PM - C.L. WAGNER, JR. NASA-GSFC
PS - R.A. LANGEL NASA-GSFC

BRIEF DESCRIPTION

THE MAGSAT PROJECT IS A JOINT NASA/UNITED STATES GEOLOGICAL SURVEY (USGS) EFFORT TO MEASURE NEAR-EARTH MAGNETIC FIELDS ON A GLOBAL BASIS. OBJECTIVES INCLUDE OBTAINING AN ACCURATE DESCRIPTION OF THE EARTH'S MAGNETIC FIELD, OBTAINING DATA FOR USE IN THE UPDATE AND REFINEMENT OF WORLD AND REGIONAL MAGNETIC CHARTS, COMPILATION OF A GLOBAL CRUSTAL MAGNETIC ANOMALY MAP AND INTERPRETATION OF THAT MAP IN TERMS OF GEOLOGIC/GEOPHYSICAL MODELS OF THE EARTH'S CRUST. THE SPACECRAFT IS LAUNCHED INTO A LOW EARTH, NEAR POLAR, ORBIT BY THE SCOUT VEHICLE. THE BASIC SPACECRAFT IS MADE UP OF TWO DISTINCT PARTS -- THE INSTRUMENT MODULE THAT CONTAINS A VECTOR AND A SCALAR MAGNETOMETER AND THEIR UNIQUE SUPPORTING GEAR; AND THE BASE MODULE THAT CONTAINS THE NECESSARY DATA HANDLING, POWER, COMMUNICATIONS, COMMAND, AND ATTITUDE CONTROL SUBSYSTEMS TO SUPPORT THE INSTRUMENT MODULE. THE BASE MODULE COMPLETE WITH ITS SUBSYSTEMS IS COMPRISED OF RESIDUAL SMALL ASTRONOMY SATELLITE (SAS-C) HARDWARE. THE MAGNETOMETERS ARE DEPLOYED AFTER LAUNCH TO A POSITION 6 M BEHIND THE SPACECRAFT. AT THIS DISTANCE, THE INFLUENCE OF MAGNETIC MATERIALS FROM THE INSTRUMENT AND BASE MODULE (CHIEFLY FROM THE STAR CAMERAS) IS LESS THAN 1 NT. FOR A LIST OF INVESTIGATORS AND THEIR INVESTIGATIONS, WHO WILL USE ONE OR BOTH OF THE EXPERIMENTS LISTED BELOW, SEE APPENDIX B.

----- MAGSAT, LANGEL-----

INVESTIGATION NAME- SCALAR MAGNETOMETER

NSSDC ID- AEM-C -01 INVESTIGATIVE PROGRAM
CODE ER/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
GEODYNAMICS

PERSONNEL

PI - R.A. LANGEL NASA-GSFC
OI - M.H. ACUNA NASA-GSFC

BRIEF DESCRIPTION

THE SCALAR MAGNETOMETER HAS TWO DUAL-CELL, CESIUM-VAPOR SENSE HEADS WHOSE OUTPUT FREQUENCY IS PROPORTIONED TO THE TOTAL MAGNETIC FIELD. WITH THIS SENSOR CONFIGURATION, ONLY TWO SMALL DIAMOND-SHAPED DEAD ZONES EXIST. THESE LIE ALONG THE ORBIT NORMAL (THE EAST-WEST DIRECTION) FOR THE ORBIT AND ATTITUDE CHOSEN FOR THIS MISSION AND A DIRECTION IN WHICH THE MAGNETIC FIELD WILL NEVER LIE. THE SCALAR MAGNETOMETER'S BASIC ACCURACY IS ON THE ORDER OF 0.5 NT. A PERIOD COUNT SYSTEM CONVERTS THE MAGNETOMETER OUTPUT FREQUENCY TO A DIGITAL WORD ACCEPTABLE TO THE SPACECRAFT TELEMETRY SYSTEM. THIS DIGITAL DATA HAS A RESOLUTION AND ACCURACY OF BETWEEN 0.5 AND 1.0 NT.

----- MAGSAT, LANGEL-----

INVESTIGATION NAME- VECTOR MAGNETOMETER

NSSDC ID- AEM-C -02 INVESTIGATIVE PROGRAM
CODE ER/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
GEODYNAMICS

PERSONNEL

PI - R.A. LANGEL NASA-GSFC
OI - M.H. ACUNA NASA-GSFC

BRIEF DESCRIPTION

THE VECTOR MAGNETOMETER CONSISTS OF THREE FLUXGATE SENSING ELEMENTS ALIGNED ALONG ORTHOGONAL AXES. THE OUTPUT OF EACH VECTOR SENSOR IS CONVERTED TO A DIGITAL WORD BY AN ANALOG TO DIGITAL CONVERTER. THE OUTPUT OF ALL THESE AXES IS SAMPLED ESSENTIALLY SIMULTANEOUSLY. EACH VECTOR MEASUREMENT HAS A RESOLUTION OF BETTER THAN 1 NT AND AN ABSOLUTE ACCURACY OF BETTER THAN 6 NT R.M.S. WHEN REFERENCED TO A GEOCENTRIC COORDINATE SYSTEM.

***** NOAA-B*****

SPACECRAFT COMMON NAME- NOAA-B
ALTERNATE NAMES-

NSSDC ID- NOAA-B

LAUNCH DATE- 11/01/79 WEIGHT- 588.9 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS F

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS
UNITED STATES NASA-OSTA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 101.5 MIN INCLINATION- 98.7 DEG
PERIAPSIS- 833. KM ALT APOAPSIS- 833. KM ALT

PERSONNEL

MG - M.L. GARBACZ NASA HEADQUARTERS
PM - G.A. BRANCHFLOWER NASA-GSFC
PS - A. ARKING NASA-GSFC

BRIEF DESCRIPTION

NOAA-B IS THE SECOND IN A SERIES OF THIRD-GENERATION, OPERATIONAL METEOROLOGICAL SATELLITES FOR USE IN THE NATIONAL OPERATIONAL ENVIRONMENTAL SATELLITE SUBSYSTEM (NOESS) AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP) DURING 1978-84. THE SATELLITE DESIGN PROVIDES AN ECONOMICAL AND STABLE SUN-SYNCHRONOUS PLATFORM FOR ADVANCED OPERATIONAL INSTRUMENTS TO MEASURE THE EARTH'S ATMOSPHERE, ITS SURFACE AND CLOUD COVER, AND THE NEAR-SPACE ENVIRONMENT. PRIMARY SENSORS INCLUDE AN ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) FOR OBSERVING DAYTIME AND NIGHTTIME GLOBAL CLOUD COVER AND AN OPERATIONAL VERTICAL SOUNDER FOR OBTAINING TEMPERATURE AND WATER VAPOR PROFILES THROUGH THE EARTH'S ATMOSPHERE. SECONDARY EXPERIMENTS CONSIST OF A SPACE ENVIRONMENT MONITOR (SEM), WHICH MEASURES THE PROTON AND ELECTRON FLUX NEAR THE EARTH, AND A DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS), WHICH PROCESSES AND RELAYS TO CENTRAL DATA ACQUISITION STATIONS THE VARIOUS METEOROLOGICAL DATA RECEIVED FROM FREE-FLOATING BALLOONS AND OCEAN BUOYS DISTRIBUTED AROUND THE GLOBE. THE SATELLITE IS BASED UPON THE BLOCK 5D SPACECRAFT BUS DEVELOPED FOR THE US AIR FORCE, AND IS CAPABLE OF MAINTAINING AN EARTH-POINTING ACCURACY OF BETTER THAN PLUS OR MINUS 0.1 DEG WITH A MOTION RATE OF LESS THAN 0.035 DEG/S.

----- NOAA-B, NESS STAFF-----

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER
(AVHRR)

NSSDC ID- NOAA-B -01 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE NOAA-B ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) IS A FOUR-CHANNEL SCANNING RADIOMETER CAPABLE OF PROVIDING GLOBAL DAYTIME AND NIGHTTIME SEA SURFACE TEMPERATURE, ICE, SNOW, AND CLOUD INFORMATION. THESE DATA ARE OBTAINED ON A DAILY BASIS FOR USE IN WEATHER ANALYSIS AND FORECASTING. THE MULTISPECTRAL RADIOMETER OPERATES IN THE SCANNING MODE AND MEASURES EMITTED AND REFLECTED RADIATION IN THE FOLLOWING SPECTRAL INTERVALS -- CHANNEL 1 (VISIBLE), 0.55 TO 0.9 MICROMETER, CHANNEL 2 (NEAR IR), 0.725 MICROMETER TO DETECTOR CUT OFF AROUND 1.3 MICROMETERS, CHANNEL 3 (IR WINDOW), 10.5 TO 11.5 MICROMETERS, AND CHANNEL 4 (IR WINDOW), 3.55 TO 3.93 MICROMETERS. ALL FOUR CHANNELS HAVE A SPATIAL RESOLUTION OF 1.1 KM, AND THE TWO IR WINDOW CHANNELS HAVE A THERMAL RESOLUTION OF 0.12 K AT 300 K. THE AVHRR IS CAPABLE OF OPERATING IN BOTH REAL-TIME OR RECORDED MODES. REAL-TIME OR DIRECT READOUT DATA ARE TRANSMITTED TO GROUND STATIONS BOTH AT LOW (4 KM) RESOLUTION VIA AUTOMATIC PICTURE TRANSMISSION (APT) AND AT HIGH (1 KM) RESOLUTION VIA HIGH RESOLUTION PICTURE TRANSMISSION (HRPT). DATA RECORDED ON BOARD ARE AVAILABLE FOR CENTRAL PROCESSING. THEY INCLUDE GLOBAL AREA COVERAGE (GAC) DATA, HAVE A RESOLUTION OF 4 KM, AND LOCAL AREA COVERAGE (LAC) DATA, WHICH CONTAINS DATA FROM SELECTED PORTIONS OF EACH ORBIT WITH A 1 KM RESOLUTION. IDENTICAL EXPERIMENTS ARE FLOWN ON THE OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-B, NESS STAFF-----

INVESTIGATION NAME- OPERATIONAL VERTICAL SOUNDER

NSSDC ID- NOAA-B -02 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE NOAA-B OPERATIONAL SOUNDER CONSISTS OF THREE INSTRUMENTS DESIGNED TO DETERMINE RADIANCES NEEDED TO CALCULATE TEMPERATURE AND HUMIDITY PROFILES OF THE ATMOSPHERE FROM THE SURFACE TO THE STRATOSPHERE (APPROXIMATELY 1 MB). THE FIRST INSTRUMENT, THE BASIC SOUNDING UNIT (BSU), HAS 14 CHANNELS AND MAKES MEASUREMENTS IN THE FOLLOWING SPECTRAL INTERVALS -- CHANNEL 1 - THE 3.7-MICROMETER WINDOW REGION, CHANNEL 2 - THE 4.3-MICROMETER CO₂ BAND, CHANNEL 3 - THE 9.7-MICROMETER OZONE BAND, CHANNEL 4 - THE 11.1-MICROMETER WINDOW REGION, CHANNELS 5 THROUGH 11 - THE 15-MICROMETER CO₂ BAND (13.3, 13.6, 14.0, 14.3, 14.5, 14.75, AND 15.0), AND CHANNELS 12 THROUGH 14 - THE 18-MICROMETER ROTATIONAL WATER VAPOR BANDS (18.8, 23.15, AND 29.4). THE SECOND INSTRUMENT, THE STRATOSPHERIC SOUNDING UNIT, HAS THREE CHANNELS OPERATING AT 14.97 MICROMETERS USING SELECTIVE ABSORPTION BY PASSING THE INCOMING RADIATION THROUGH THREE PRESSURE MODULATED CELLS CONTAINING CO₂. THE THIRD INSTRUMENT, THE MICROWAVE SOUNDING UNIT, HAS FOUR CHANNELS OPERATING IN THE 50 TO 60 GHZ OXYGEN BAND (50.3, 53.7, 55.0, AND 57.9) TO OBTAIN TEMPERATURE PROFILES WHICH ARE FREE OF CLOUD INTERFERENCE. THE INSTRUMENTS ARE CROSS-COURSE SCANNING DEVICES UTILIZING A STEP TO PROVIDE A TRAVERSE SCAN WHILE THE ORBITAL MOTION OF THE SATELLITE PROVIDES SCANNING IN THE ORTHOGONAL DIRECTION. SIMILAR EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-B, NESS STAFF-----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)

NSSDC ID- NOAA-B -03 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS) ON NOAA-B IS DESIGNED TO MEET THE METEOROLOGICAL DATA NEEDS OF THE UNITED STATES AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP). THE SYSTEM RECEIVES LOW DUTY CYCLE TRANSMISSIONS OF METEOROLOGICAL OBSERVATIONS FROM FREE-FLOATING BALLOONS, OCEAN BUOYS, OTHER SATELLITES, AND FIXED GROUND-BASED SENSOR PLATFORMS DISTRIBUTED AROUND THE GLOBE. THESE OBSERVATIONS ARE ORGANIZED ON BOARD THE SPACECRAFT AND RETRANSMITTED WHEN THE SPACECRAFT COMES IN RANGE OF A COMMAND AND DATA ACQUISITION (CDA) STATION. FOR FREE-MOVING BALLOONS, THE DOPPLER FREQUENCY SHIFT OF THE TRANSMITTED SIGNAL IS OBSERVED TO CALCULATE THE LOCATION OF THE BALLOONS. THE DCS IS EXPECTED, FOR A MOVING SENSOR PLATFORM, TO HAVE A LOCATION ACCURACY OF 5 TO 8 KM RMS, AND A VELOCITY ACCURACY OF 1 TO 1.6 M/S. THIS SYSTEM HAS THE CAPABILITY OF ACQUIRING DATA FROM UP TO 2000 PLATFORMS PER DAY. IDENTICAL EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-B, WILLIAMS-----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NSSDC ID- NOAA-B -04 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - H.H. SAUER NOAA-ERL
OI - C.O. BOSTROM APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT IS AN EXTENSION OF THE SOLAR PROTON MONITORING EXPERIMENT FLOWN ON THE ITOS SPACECRAFT SERIES. THE EXPERIMENT PACKAGE CONSISTS OF FOUR DETECTOR SYSTEMS AND A DATA PROCESSING UNIT. THE LOW-ENERGY PROTON ALPHA TELESCOPE (LEPAT) SEPARATELY MEASURES IN FIVE ENERGY RANGES BOTH PROTONS BETWEEN 150 KEV AND 40 MEV AND ALPHA PARTICLES BETWEEN 150 KEV/N AND 25 MEV/N. THERE ARE TWO LEPATS VIEWING IN THE ANTI-SUN AND ANTI-EARTH DIRECTIONS WITH 60-DEG VIEWING CONES. THE PROTON OMNIDIRECTIONAL DETECTOR (POD) MEASURES PROTONS ABOVE 10, 30, AND 60 MEV, ELECTRONS ABOVE 140 KEV, AND PROTONS AND ELECTRONS (INSEPARABLE) ABOVE 750 KEV. THE HIGH-ENERGY PROTON ALPHA TELESCOPE (HEPAT) HAS A 50-DEG VIEWING CONE, VIEW IN THE ANTI-EARTH DIRECTION, AND IT MEASURES PROTONS ABOVE 400 MEV AND PROTONS AND ALPHA PARTICLES ABOVE 600 AND 1000 MEV/N. THE TOTAL ENERGY DETECTOR (TED) MEASURES TOTAL ENERGY ABOVE 1 KEV.

***** NOAA-C*****

SPACECRAFT COMMON NAME- NOAA-C
ALTERNATE NAMES-

NSSDC ID- NOAA-C

LAUNCH DATE- 02/01/80 WEIGHT- 588.9 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS F

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS
UNITED STATES NASA-OSTA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 101.5 MIN INCLINATION- 98.7 DEG
PERIAPSIS- 833. KM ALT APOAPSIS- 833. KM ALT

PERSONNEL
MG - M.L. GARBACZ NASA HEADQUARTERS
PM - G.A. BRANCHFLOWER NASA-GSFC
PS - A. ARKING NASA-GSFC

BRIEF DESCRIPTION

NOAA-C IS THE THIRD IN A SERIES OF THIRD-GENERATION, OPERATIONAL METEOROLOGICAL SATELLITES FOR USE IN THE NATIONAL OPERATIONAL ENVIRONMENTAL SATELLITE SUBSYSTEM (NOESS) AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP) DURING 1978-84. THE SATELLITE DESIGN PROVIDES AN ECONOMICAL AND STABLE SUN-SYNCHRONOUS PLATFORM FOR ADVANCED OPERATIONAL INSTRUMENTS TO MEASURE THE EARTH'S ATMOSPHERE, ITS SURFACE AND CLOUD COVER, AND THE NEAR-SPACE ENVIRONMENT. PRIMARY SENSORS INCLUDE AN ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) FOR OBSERVING DAYTIME AND NIGHTTIME GLOBAL CLOUD COVER AND AN OPERATIONAL VERTICAL SOUNDER FOR OBTAINING TEMPERATURE AND WATER VAPOR PROFILES THROUGH THE EARTH'S ATMOSPHERE. SECONDARY EXPERIMENTS CONSIST OF A SPACE ENVIRONMENT MONITOR (SEM), WHICH MEASURES THE PROTON AND ELECTRON FLUX NEAR THE EARTH, AND A DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS), WHICH PROCESSES AND RELAYS TO CENTRAL DATA ACQUISITION STATIONS THE VARIOUS METEOROLOGICAL DATA RECEIVED FROM FREE-FLOATING BALLOONS AND OCEAN BUOYS DISTRIBUTED AROUND THE GLOBE. THE SATELLITE IS BASED UPON THE BLOCK 50 SPACECRAFT BUS DEVELOPED FOR THE US AIR FORCE, AND IS CAPABLE OF MAINTAINING AN EARTH-POINTING ACCURACY OF BETTER THAN PLUS OR MINUS 0.1 DEG WITH A MOTION RATE OF LESS THAN 0.035 DEG/S.

----- NOAA-C, NESS STAFF-----

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)

NSSDC ID- NOAA-C -01 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE NOAA-C ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) WILL BE A FOUR CHANNEL SCANNING RADIOMETER CAPABLE OF PROVIDING GLOBAL DAYTIME AND NIGHTTIME SEA SURFACE TEMPERATURE, ICE, SNOW, AND CLOUD INFORMATION. THESE DATA WILL BE OBTAINED ON A DAILY BASIS FOR USE IN WEATHER ANALYSIS AND FORECASTING. THE MULTISPECTRAL RADIOMETER WILL OPERATE IN THE SCANNING MODE AND WILL MEASURE EMITTED AND REFLECTED RADIATION IN THE

FOLLOWING SPECTRAL INTERVALS -- CHANNEL 1 (VISIBLE), 0.55 TO 0.9 MICROMETER, CHANNEL 2 (NEAR IR), 0.725 MICROMETER TO DETECTOR CUT OFF AROUND 1.3 MICROMETERS, CHANNEL 3 (IR WINDOW), 10.5 TO 11.5 MICROMETERS, AND CHANNEL 4 (IR WINDOW), 3.55 TO 3.93 MICROMETERS. ALL FOUR CHANNELS WILL HAVE A SPATIAL RESOLUTION OF 1.1 KM, AND THE TWO IR WINDOW CHANNELS WILL HAVE A THERMAL RESOLUTION OF 0.12 DEG K AT 300 DEG K. THE AVHRR WILL BE CAPABLE OF OPERATING IN BOTH REAL-TIME OR RECORDED MODES. REAL-TIME OR DIRECT READOUT DATA WILL BE TRANSMITTED TO GROUND STATIONS BOTH AT LOW (4 KM) RESOLUTION VIA AUTOMATIC PICTURE TRANSMISSION (APT) AND AT HIGH (1 KM) RESOLUTION VIA HIGH RESOLUTION PICTURE TRANSMISSION (HRPT). DATA RECORDED ON BOARD WILL BE AVAILABLE FOR CENTRAL PROCESSING. THEY INCLUDE GLOBAL AREA COVERAGE (GAC) DATA, WHICH HAVE A RESOLUTION OF 4 KM, AND LOCAL AREA COVERAGE (LAC) DATA, WHICH WILL CONTAIN DATA FROM SELECTED PORTIONS OF EACH ORBIT WITH A 1 KM RESOLUTION. IDENTICAL EXPERIMENTS WILL BE FLOWN ON THE OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-C, NESS STAFF-----

INVESTIGATION NAME- OPERATIONAL VERTICAL SOUNDER

NSSDC ID- NOAA-C -02 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE NOAA-C OPERATIONAL SOUNDER CONSISTS OF THREE INSTRUMENTS DESIGNED TO DETERMINE RADIANCES NEEDED TO CALCULATE TEMPERATURE AND HUMIDITY PROFILES OF THE ATMOSPHERE FROM THE SURFACE TO THE STRATOSPHERE (APPROXIMATELY 1 MB). THE FIRST INSTRUMENT, THE BASIC SOUNDING UNIT (BSU), HAS 14 CHANNELS AND MAKES MEASUREMENTS IN THE FOLLOWING SPECTRAL INTERVALS -- CHANNEL 1 - THE 3.7 MICROMETER WINDOW REGION, CHANNEL 2 - THE 4.3 MICROMETER CARBON DIOXIDE BAND, CHANNEL 3 - THE 9.7 MICROMETER OZONE BAND, CHANNEL 4 - THE 11.1 MICROMETER WINDOW REGION, CHANNELS 5 THROUGH 11 - THE 15 MICROMETER CARBON DIOXIDE BAND (13.3, 13.6, 14.0, 14.3, 14.5, 14.75, AND 15.0), AND CHANNELS 12 THROUGH 14 - THE 18 TO 30 MICROMETER ROTATIONAL WATER VAPOR BANDS (18.8, 23.15, AND 29.4). THE SECOND INSTRUMENT, THE STRATOSPHERIC SOUNDING UNIT, WHICH HAS THREE CHANNELS OPERATING AT 14.97 MICROMETERS USING SELECTIVE ABSORPTION BY PASSING THE INCOMING RADIATION THROUGH THREE PRESSURE-MODULATED CELLS CONTAINING CARBON DIOXIDE. THE THIRD INSTRUMENT, THE MICROWAVE SOUNDING UNIT, HAS FOUR CHANNELS OPERATING IN THE 50 TO 60 GHZ OXYGEN BAND (50.3, 53.7, 55.0, AND 57.9), WILL OBTAIN TEMPERATURE PROFILES WHICH ARE FREE OF CLOUD INTERFERENCE. THE INSTRUMENTS ARE CROSS-COURSE SCANNING DEVICES UTILIZING A STEP SCAN TO PROVIDE A TRAVERSE SCAN WHILE THE ORBITAL MOTION OF THE SATELLITE PROVIDES SCANNING IN THE ORTHOGONAL DIRECTION. SIMILAR EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-C, NESS STAFF-----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)

NSSDC ID- NOAA-C -03 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS) ON NOAA-C IS DESIGNED TO MEET THE METEOROLOGICAL DATA NEEDS OF THE UNITED STATES AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP). THE SYSTEM RECEIVES LOW DUTY CYCLE TRANSMISSIONS OF METEOROLOGICAL OBSERVATIONS FROM FREE-FLOATING BALLOONS, OCEAN BUOYS, OTHER SATELLITES, AND FIXED GROUND-BASED SENSOR PLATFORMS DISTRIBUTED AROUND THE GLOBE. THESE OBSERVATIONS ARE ORGANIZED ON BOARD THE SPACECRAFT AND RETRANSMITTED WHEN THE SPACECRAFT COMES IN RANGE OF A COMMAND AND DATA ACQUISITION (CDA) STATION. FOR FREE-MOVING BALLOONS, THE DOPPLER FREQUENCY SHIFT OF THE TRANSMITTED SIGNAL IS OBSERVED TO CALCULATE THE LOCATION OF THE BALLOONS. THE DCS IS EXPECTED, FOR A MOVING SENSOR PLATFORM, TO HAVE A LOCATION ACCURACY OF 5 TO 8 KM RMS, AND A VELOCITY ACCURACY OF 1 TO 1.6 M/S. THIS SYSTEM HAS THE CAPABILITY OF ACQUIRING DATA FROM UP TO 2000 PLATFORMS PER DAY. IDENTICAL EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-C, WILLIAMS-----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NSSDC ID- NOAA-C -04 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS
OI - H.H. SAUER
OI - C.O. BOSTROM

NOAA-ERL
NOAA-ERL
APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT IS AN EXTENSION OF THE SOLAR PROTON MONITORING EXPERIMENT FLOWN ON THE ITOS SPACECRAFT SERIES. THE EXPERIMENT PACKAGE CONSISTS OF FOUR DETECTOR SYSTEMS AND A DATA PROCESSING UNIT. THE LOW-ENERGY PROTON ALPHA TELESCOPE (LEPAT) SEPARATELY MEASURES IN FIVE ENERGY RANGES BOTH PROTONS BETWEEN 150 KEV AND 40 MEV AND ALPHA PARTICLES BETWEEN 150 KEV/N AND 25 MEV/N. THERE ARE TWO LEPATS VIEWING IN THE ANTI-SUN AND ANTI-EARTH DIRECTIONS WITH 60-DEG VIEWING CONES. THE PROTON OMNIDIRECTIONAL DETECTOR (POD) MEASURES PROTONS ABOVE 10, 30, AND 60 MEV, ELECTRONS ABOVE 140 KEV, AND PROTONS AND ELECTRONS (INSEPARABLE) ABOVE 750 KEV. THE HIGH-ENERGY PROTON ALPHA TELESCOPE (HEPAT) HAS A 50-DEG VIEWING CONE, VIEWS IN THE ANTI-EARTH DIRECTION, AND MEASURES PROTONS ABOVE 400 MEV AND PROTONS AND ALPHA PARTICLES ABOVE 600 AND 1000 MEV/N. THE TOTAL ENERGY DETECTOR (TED) MEASURES TOTAL ENERGY ABOVE 1 KEV.

***** NOAA-D*****

SPACECRAFT COMMON NAME- NOAA-D
ALTERNATE NAMES-

NSSDC ID- NOAA-D

LAUNCH DATE- 08/01/81 WEIGHT- 588.9 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS F

SPONSORING COUNTRY/AGENCY

UNITED STATES NOAA-NESS
UNITED STATES NASA-OSTA

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 101.5 MIN INCLINATION- 98.7 DEG
PERIAPSIS- 833. KM ALT APOAPSIS- 833. KM ALT

PERSONNEL

MG - M.L. GARBACZ NASA HEADQUARTERS
PM - G.A. BRANCHFLOWER NASA-GSFC
PS - A. ARKING NASA-GSFC

BRIEF DESCRIPTION

NOAA-D IS THE FOURTH IN A SERIES OF THIRD-GENERATION, OPERATIONAL METEOROLOGICAL SATELLITES FOR USE IN THE NATIONAL OPERATIONAL ENVIRONMENTAL SATELLITE SUBSYSTEM (NOESS) AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP) DURING 1978-84. THE SATELLITE DESIGN PROVIDES AN ECONOMICAL AND STABLE SUN-SYNCHRONOUS PLATFORM FOR ADVANCED OPERATIONAL INSTRUMENTS TO MEASURE THE EARTH'S ATMOSPHERE, ITS SURFACE AND CLOUD COVER, AND THE NEAR-SPACE ENVIRONMENT. PRIMARY SENSORS INCLUDE AN ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) FOR OBSERVING DAYTIME AND NIGHTTIME GLOBAL CLOUD COVER AND AN OPERATIONAL VERTICAL SOUNDER FOR OBTAINING TEMPERATURE AND WATER VAPOR PROFILES THROUGH THE EARTH'S ATMOSPHERE. SECONDARY EXPERIMENTS CONSIST OF A SPACE ENVIRONMENT MONITOR (SEM), WHICH MEASURES THE PROTON AND ELECTRON FLUX NEAR THE EARTH, AND A DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS), WHICH PROCESSES AND RELAYS TO CENTRAL DATA ACQUISITION STATIONS THE VARIOUS METEOROLOGICAL DATA RECEIVED FROM FREE-FLOATING BALLOONS AND OCEAN BUOYS DISTRIBUTED AROUND THE GLOBE. THE SATELLITE IS BASED UPON THE BLOCK 5D SPACECRAFT BUS DEVELOPED FOR THE US AIR FORCE, AND IS CAPABLE OF MAINTAINING AN EARTH-POINTING ACCURACY OF BETTER THAN PLUS OR MINUS 0.1 DEG WITH A MOTION RATE OF LESS THAN 0.035 DEG/S.

----- NOAA-D, NESS STAFF-----

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)

NSSDC ID- NOAA-D -01 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE NOAA-D ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) IS A FOUR-CHANNEL SCANNING RADIOMETER CAPABLE OF PROVIDING GLOBAL DAYTIME AND NIGHTTIME SEA SURFACE TEMPERATURE, ICE, SNOW, AND CLOUD INFORMATION. THESE DATA ARE OBTAINED ON A DAILY BASIS FOR USE IN WEATHER ANALYSIS AND FORECASTING. THE MULTISPECTRAL RADIOMETER OPERATES IN THE SCANNING MODE AND MEASURES EMITTED AND REFLECTED RADIATION IN THE FOLLOWING SPECTRAL INTERVALS -- CHANNEL 1 (VISIBLE), 0.55 TO 0.9 MICROMETER, CHANNEL 2 (NEAR IR), 0.725 MICROMETER TO DETECTOR CUTOFF AROUND 1.3 MICROMETERS, CHANNEL 3 (IR WINDOW), 10.5 TO 11.5 MICROMETERS, AND CHANNEL 4 (IR WINDOW), 3.55 TO 3.93 MICROMETERS. ALL FOUR CHANNELS HAVE A SPATIAL RESOLUTION OF 1.1 KM, AND THE TWO IR WINDOW CHANNELS HAVE A THERMAL RESOLUTION OF 0.12 K AT 300 K. THE AVHRR IS CAPABLE OF OPERATING IN BOTH REAL-TIME OR RECORDED MODES. REAL-TIME OR DIRECT READOUT DATA ARE TRANSMITTED TO GROUND STATIONS BOTH AT LOW (4 KM) RESOLUTION VIA AUTOMATIC PICTURE TRANSMISSION (APT)

AND AT HIGH (1 KM) RESOLUTION VIA HIGH RESOLUTION PICTURE TRANSMISSION (HRPT). DATA RECORDED ON BOARD ARE AVAILABLE FOR CENTRAL PROCESSING. THEY INCLUDE GLOBAL AREA COVERAGE (GAC) DATA, HAVE A RESOLUTION OF 4 KM, AND LOCAL AREA COVERAGE (LAC) DATA, WHICH CONTAINS DATA FROM SELECTED PORTIONS OF EACH ORBIT WITH A 1 KM RESOLUTION. IDENTICAL EXPERIMENTS ARE FLOWN ON THE OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-D, NESS STAFF-----

INVESTIGATION NAME- OPERATIONAL VERTICAL SOUNDER

NSSDC ID- NOAA-D -02 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE NOAA-D OPERATIONAL SOUNDER CONSISTS OF THREE INSTRUMENTS DESIGNED TO DETERMINE RADIANCES NEEDED TO CALCULATE TEMPERATURE AND HUMIDITY PROFILES OF THE ATMOSPHERE FROM THE SURFACE TO THE STRATOSPHERE (APPROXIMATELY 1 MB). THE FIRST INSTRUMENT, THE BASIC SOUNDING UNIT (BSU), HAS 14 CHANNELS AND MAKES MEASUREMENTS IN THE FOLLOWING SPECTRAL INTERVALS: CHANNEL 1 - THE 3.7-MICROMETER WINDOW REGION, CHANNEL 2 - THE 4.3-MICROMETER CO2 BAND, CHANNEL 3 - THE 9.7-MICROMETER OZONE BAND, CHANNEL 4 - THE 11.1-MICROMETER WINDOW REGION, CHANNELS 5 THROUGH 11 - THE 15-MICROMETER CO2 BAND (13.3, 13.6, 14.0, 14.3, 14.5, 14.75, AND 15.0), AND CHANNELS 12 THROUGH 14 - THE 18-MICROMETER ROTATIONAL WATER VAPOR BANDS (18.8, 23.15, AND 29.4). THE SECOND INSTRUMENT, THE STRATOSPHERIC SOUNDING UNIT, HAS THREE CHANNELS OPERATING AT 14.97 MICROMETERS USING SELECTIVE ABSORPTION BY PASSING THE INCOMING RADIATION THROUGH THREE PRESSURE-MODULATED CELLS CONTAINING CO2. THE THIRD INSTRUMENT, THE MICROWAVE SOUNDING UNIT, HAS FOUR CHANNELS OPERATING IN THE 50 TO 60 GHZ OXYGEN BAND (50.3, 53.7, 55.0, AND 57.9) TO OBTAIN TEMPERATURE PROFILES WHICH ARE FREE OF CLOUD INTERFERENCE. THE INSTRUMENTS ARE CROSS-COURSE SCANNING DEVICES UTILIZING A STEP TO PROVIDE A TRAVERSE SCAN WHILE THE ORBITAL MOTION OF THE SATELLITE PROVIDES SCANNING IN THE ORTHOGONAL DIRECTION. SIMILAR EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-D, NESS STAFF-----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)

NSSDC ID- NOAA-D -03 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS) ON NOAA-D IS DESIGNED TO MEET THE METEOROLOGICAL DATA NEEDS OF THE UNITED STATES AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP). THE SYSTEM RECEIVES LOW DUTY CYCLE TRANSMISSIONS OF METEOROLOGICAL OBSERVATIONS FROM FREE-FLOATING BALLOONS, OCEAN BUOYS, OTHER SATELLITES, AND FIXED GROUND-BASED SENSOR PLATFORMS DISTRIBUTED AROUND THE GLOBE. THESE OBSERVATIONS ARE ORGANIZED ON BOARD THE SPACECRAFT AND RETRANSMITTED WHEN THE SPACECRAFT COMES IN RANGE OF A COMMAND AND DATA ACQUISITION (CDA) STATION. FOR FREE-MOVING BALLOONS, THE DOPPLER FREQUENCY SHIFT OF THE TRANSMITTED SIGNAL IS OBSERVED TO CALCULATE THE LOCATION OF THE BALLOONS. THE DCS IS EXPECTED, FOR A MOVING SENSOR PLATFORM, TO HAVE A LOCATION ACCURACY OF 5 TO 8 KM RMS, AND A VELOCITY ACCURACY OF 1 TO 1.6 M/S. THIS SYSTEM HAS THE CAPABILITY OF ACQUIRING DATA FROM UP TO 2000 PLATFORMS PER DAY. IDENTICAL EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-D, WILLIAMS-----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NSSDC ID- NOAA-D -04 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - H.H. SAUER NOAA-ERL
OI - C.O. BOSTROM APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT IS AN EXTENSION OF THE SOLAR PROTON MONITORING EXPERIMENT FLOWN ON THE TIROS SPACECRAFT SERIES. THE EXPERIMENT PACKAGE CONSISTS OF FOUR DETECTOR SYSTEMS AND A DATA PROCESSING UNIT. THE LOW-ENERGY PROTON ALPHA TELESCOPE (LEPAT) SEPARATELY MEASURES IN FIVE ENERGY RANGES BOTH PROTONS BETWEEN 150 KEV AND 40 MEV AND ALPHA PARTICLES BETWEEN 150 KEV/N AND 25 MEV/N. THERE ARE TWO LEPATs VIEWING IN THE ANTI-SUN AND ANTI-EARTH DIRECTIONS WITH 60-DEG VIEWING CONES. THE PROTON OMNIDIRECTIONAL DETECTOR (POD) MEASURES PROTONS ABOVE 10, 30,

AND 60 MEV, ELECTRONS ABOVE 140 KEV, AND PROTONS AND ELECTRONS (INSEPARABLE) ABOVE 750 KEV. THE HIGH-ENERGY PROTON ALPHA TELESCOPE (HEPAT) HAS A 50-DEG VIEWING CONE, VIEWS IN THE ANTI-EARTH DIRECTION, AND MEASURES PROTONS ABOVE 400 MEV AND PROTONS AND ALPHA PARTICLES ABOVE 600 AND 1000 MEV/N. THE TOTAL ENERGY DETECTOR (TED) MEASURES TOTAL ENERGY ABOVE 1 KEV.

***** NOAA-E*****

SPACECRAFT COMMON NAME- NOAA-E
ALTERNATE NAMES-

NSSDC ID- NOAA-E

LAUNCH DATE- 02/01/82 WEIGHT- 588.9 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS F

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS
UNITED STATES NASA-OSTA

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 101.5 MIN INCLINATION- 98.7 DEG
PERIAPSIS- 833. KM ALT APOAPSIS- 833. KM ALT

PERSONNEL
MG - M.L. GARBACZ NASA HEADQUARTERS
PM - G.A. BRANCHFLOWER NASA-GSFC
PS - A. ARKING NASA-GSFC

BRIEF DESCRIPTION

NOAA-E IS THE FIFTH IN A SERIES OF THIRD-GENERATION, OPERATIONAL METEOROLOGICAL SATELLITES FOR USE IN THE NATIONAL OPERATIONAL ENVIRONMENTAL SATELLITE SUBSYSTEM (NOESS) AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP) DURING 1978-84. THE SATELLITE DESIGN PROVIDES AN ECONOMIC AND STABLE SUN-SYNCHRONOUS PLATFORM FOR ADVANCED OPERATIONAL INSTRUMENTS TO MEASURE THE EARTH'S ATMOSPHERE, ITS SURFACE AND CLOUD COVER, AND THE NEAR-SPACE ENVIRONMENT. PRIMARY SENSORS INCLUDE AN ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) FOR OBSERVING DAYTIME AND NIGHTTIME GLOBAL CLOUD COVER AND AN OPERATIONAL VERTICAL SOUNDER FOR OBTAINING TEMPERATURE AND WATER VAPOR PROFILES THROUGH THE EARTH'S ATMOSPHERE. SECONDARY EXPERIMENTS CONSIST OF A SPACE ENVIRONMENT MONITOR (SEM), WHICH MEASURES THE PROTON AND ELECTRON FLUX NEAR THE EARTH, AND A DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS), WHICH PROCESSES AND RELAYS TO CENTRAL DATA ACQUISITION STATIONS THE VARIOUS METEOROLOGICAL DATA RECEIVED FROM FREE-FLOATING BALLOONS AND OCEAN BUOYS DISTRIBUTED AROUND THE GLOBE. THE SATELLITE IS BASED UPON THE BLOCK 5D SPACECRAFT BUS DEVELOPED FOR THE US AIR FORCE, AND IS CAPABLE OF MAINTAINING AN EARTH-POINTING ACCURACY OF BETTER THAN PLUS OR MINUS 0.1 DEG WITH A MOTION RATE OF LESS THAN 0.035 DEG/S.

----- NOAA-E, NESS STAFF-----

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)

NSSDC ID- NOAA-E -01 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE NOAA-E ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) IS A FOUR-CHANNEL SCANNING RADIOMETER CAPABLE OF PROVIDING GLOBAL DAYTIME AND NIGHTTIME SEA SURFACE TEMPERATURE, ICE, SNOW, AND CLOUD INFORMATION. THESE DATA ARE OBTAINED ON A DAILY BASIS FOR USE IN WEATHER ANALYSIS AND FORECASTING. THE MULTISPECTRAL RADIOMETER OPERATES IN THE SCANNING MODE AND MEASURES EMITTED AND REFLECTED RADIATION IN THE FOLLOWING SPECTRAL INTERVALS -- CHANNEL 1 (VISIBLE), 0.55 TO 0.9 MICROMETER, CHANNEL 2 (NEAR IR), 0.725 MICROMETER TO DETECTOR CUTOFF AROUND 1.3 MICROMETERS, CHANNEL 3 (IR WINDOW), 10.5 TO 11.5 MICROMETERS, AND CHANNEL 4 (IR WINDOW), 3.55 TO 3.93 MICROMETERS. ALL FOUR CHANNELS HAVE A SPATIAL RESOLUTION OF 1.1 KM, AND THE TWO IR WINDOW CHANNELS HAVE A THERMAL RESOLUTION OF 0.12 K AT 300 K. THE AVHRR IS CAPABLE OF OPERATING IN BOTH REAL-TIME OR RECORDED MODES. REAL-TIME OR DIRECT READOUT DATA ARE TRANSMITTED TO GROUND STATIONS BOTH AT LOW (4 KM) RESOLUTION VIA AUTOMATIC PICTURE TRANSMISSION (APT) AND AT HIGH (1 KM) RESOLUTION VIA HIGH RESOLUTION PICTURE TRANSMISSION (HRPT). DATA RECORDED ON BOARD ARE AVAILABLE FOR CENTRAL PROCESSING. THEY INCLUDE GLOBAL AREA COVERAGE (GAC) DATA, HAVE A RESOLUTION OF 4 KM, AND LOCAL AREA COVERAGE (LAC) DATA, WHICH CONTAINS DATA FROM SELECTED PORTIONS OF EACH ORBIT WITH A 1-KM RESOLUTION. IDENTICAL EXPERIMENTS ARE FLOWN ON THE OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-E, NESS STAFF-----

INVESTIGATION NAME- OPERATIONAL VERTICAL SOUNDER

NSSDC ID- NOAA-E -02 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE NOAA-E OPERATIONAL SOUNDER CONSISTS OF THREE INSTRUMENTS DESIGNED TO DETERMINE RADIANCES NEEDED TO CALCULATE TEMPERATURE AND HUMIDITY PROFILES OF THE ATMOSPHERE FROM THE SURFACE TO THE STRATOSPHERE (APPROXIMATELY 1 MB). THE FIRST INSTRUMENT, THE BASIC SOUNDING UNIT (BSU), HAS 14 CHANNELS AND MAKES MEASUREMENTS IN THE FOLLOWING SPECTRAL INTERVALS: CHANNEL 1 - THE 3.7-MICROMETER WINDOW REGION, CHANNEL 2 - THE 4.3-MICROMETER CO₂ BAND, CHANNEL 3 - THE 9.7-MICROMETER OZONE BAND, CHANNEL 4 - THE 11.1-MICROMETER WINDOW REGION, CHANNELS 5 THROUGH 11 - THE 15-MICROMETER CO₂ BAND (13.3, 13.6, 14.0, 14.3, 14.5, 14.75, AND 15.0), AND CHANNELS 12 THROUGH 14 - THE 18-MICROMETER ROTATIONAL WATER VAPOR BANDS (18.8, 23.15, AND 29.4). THE SECOND INSTRUMENT, THE STRATOSPHERIC SOUNDING UNIT, HAS THREE CHANNELS OPERATING AT 14.97 MICROMETERS USING SELECTIVE ABSORPTION BY PASSING THE INCOMING RADIATION THROUGH THREE PRESSURE-MODULATED CELLS CONTAINING CO₂. THE THIRD INSTRUMENT, THE MICROWAVE SOUNDING UNIT, HAS FOUR CHANNELS OPERATING IN THE 50- TO 60-GHZ OXYGEN BAND (50.3, 53.7, 55.0, AND 57.9) TO OBTAIN TEMPERATURE PROFILES WHICH ARE FREE OF CLOUD INTERFERENCE. THE INSTRUMENTS ARE CROSS-COURSE SCANNING DEVICES UTILIZING A STEP TO PROVIDE A TRAVERSE SCAN WHILE THE ORBITAL MOTION OF THE SATELLITE PROVIDES SCANNING IN THE ORTHOGONAL DIRECTION. SIMILAR EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-E, NESS STAFF-----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)

NSSDC ID- NOAA-E -03 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS) ON NOAA-E IS DESIGNED TO MEET THE METEOROLOGICAL DATA NEEDS OF THE UNITED STATES AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP). THE SYSTEM RECEIVES LOW DUTY CYCLE TRANSMISSIONS OF METEOROLOGICAL OBSERVATIONS FROM FREE-FLOATING BALLOONS, OCEAN BUOYS, OTHER SATELLITES, AND FIXED GROUND-BASED SENSOR PLATFORMS DISTRIBUTED AROUND THE GLOBE. THESE OBSERVATIONS ARE ORGANIZED ON BOARD THE SPACECRAFT AND RETRANSMITTED WHEN THE SPACECRAFT COMES IN RANGE OF A COMMAND AND DATA ACQUISITION (CDA) STATION. FOR FREE-MOVING BALLOONS, THE DOPPLER FREQUENCY SHIFT OF THE TRANSMITTED SIGNAL IS OBSERVED TO CALCULATE THE LOCATION OF THE BALLOONS. THE DCS IS EXPECTED, FOR A MOVING SENSOR PLATFORM, TO HAVE A LOCATION ACCURACY OF 5 TO 8 KM RMS, AND A VELOCITY ACCURACY OF 1 TO 1.6 M/S. THIS SYSTEM HAS THE CAPABILITY OF ACQUIRING DATA FROM UP TO 2000 PLATFORMS PER DAY. IDENTICAL EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-E, WILLIAMS-----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NSSDC ID- NOAA-E -04 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - H.H. SAUER NOAA-ERL
OI - C.O. BOSTROM APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT IS AN EXTENSION OF THE SOLAR PROTON MONITORING EXPERIMENT FLOWN ON THE ITOS SPACECRAFT SERIES. THE EXPERIMENT PACKAGE CONSISTS OF FOUR DETECTOR SYSTEMS AND A DATA PROCESSING UNIT. THE LOW-ENERGY PROTON ALPHA TELESCOPE (LEPAT) SEPARATELY MEASURES IN FIVE ENERGY RANGES BOTH PROTONS BETWEEN 150 KEV AND 40 MEV AND ALPHA PARTICLES BETWEEN 150 KEV/N AND 25 MEV/N. THERE ARE TWO LEPATs VIEWING IN THE ANTI-SUN AND ANTI-EARTH DIRECTIONS WITH 60-DEG VIEWING CONES. THE PROTON OMNIDIRECTIONAL DETECTOR (POD) MEASURES PROTONS ABOVE 10, 30, AND 60 MEV, ELECTRONS ABOVE 140 KEV, AND PROTONS AND ELECTRONS (INSEPARABLE) ABOVE 750 KEV. THE HIGH-ENERGY PROTON ALPHA TELESCOPE (HEPAT) HAS A 50-DEG VIEWING CONE, VIEWS IN THE ANTI-EARTH DIRECTION, AND MEASURES PROTONS ABOVE 400 MEV AND PROTONS AND ALPHA PARTICLES ABOVE 600 AND 1000 MEV/N. THE TOTAL ENERGY DETECTOR (TED) MEASURES TOTAL ENERGY ABOVE 1 KEV.

***** NOAA-F*****

SPACECRAFT COMMON NAME- NOAA-F
ALTERNATE NAMES-

NSSDC ID- NOAA-F

LAUNCH DATE- 05/01/83 WEIGHT- 588.9 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS F

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS
UNITED STATES NASA-OSTA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 101.5 MIN
PERIAPSIS- 833. KM ALT

INCLINATION- 98.7 DEG
APOAPSIS- 833. KM ALT

PERSONNEL
MG - M.L. GARBACZ NASA HEADQUARTERS
PM - G.A. BRANCHFLOWER NASA-GSFC
PS - A. ARKING NASA-GSFC

BRIEF DESCRIPTION

NOAA-F IS THE SIXTH IN A SERIES OF THIRD-GENERATION, OPERATIONAL METEOROLOGICAL SATELLITES FOR USE IN THE NATIONAL OPERATIONAL ENVIRONMENTAL SATELLITE SUBSYSTEM (NOESS) AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP) DURING 1978-84. THE SATELLITE DESIGN PROVIDES AN ECONOMICAL AND STABLE SUN-SYNCHRONOUS PLATFORM FOR ADVANCED OPERATIONAL INSTRUMENTS TO MEASURE THE EARTH'S ATMOSPHERE, ITS SURFACE AND CLOUD COVER, AND THE NEAR-SPACE ENVIRONMENT. PRIMARY SENSORS INCLUDE AN ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) FOR OBSERVING DAYTIME AND NIGHTTIME GLOBAL CLOUD COVER AND AN OPERATIONAL VERTICAL SOUNDER FOR OBTAINING TEMPERATURE AND WATER VAPOR PROFILES THROUGH THE EARTH'S ATMOSPHERE. SECONDARY EXPERIMENTS CONSIST OF A SPACE ENVIRONMENT MONITOR (SEM), WHICH MEASURES THE PROTON AND ELECTRON FLUX NEAR THE EARTH, AND A DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS), WHICH PROCESSES AND RELAYS TO CENTRAL DATA ACQUISITION STATIONS THE VARIOUS METEOROLOGICAL DATA RECEIVED FROM FREE-FLOATING BALLOONS AND OCEAN BUOYS DISTRIBUTED AROUND THE GLOBE. THE SATELLITE IS BASED UPON THE BLOCK 5D SPACECRAFT BUS DEVELOPED FOR THE US AIR FORCE, AND IS CAPABLE OF MAINTAINING AN EARTH-POINTING ACCURACY OF BETTER THAN PLUS OR MINUS 0.1 DEG WITH A MOTION RATE OF LESS THAN 0.035 DEG/S.

----- NOAA-F, BROOME-----

INVESTIGATION NAME- EARTH RADIATION BUDGET INSTRUMENT (ERBI)

NSSDC ID- NOAA-F -05 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
TL - G.C. BROOME NASA-LARC
TM - A.A. RUDMANN NASA-GSFC

BRIEF DESCRIPTION

THE EARTH RADIATION BUDGET SATELLITE SYSTEM (ERBSS) IS DESIGNED TO MEASURE THE ENERGY EXCHANGE BETWEEN THE EARTH-ATMOSPHERE SYSTEM AND SPACE. THESE MEASUREMENTS ARE IMPORTANT FOR CLIMATE PREDICTION AND IN DEVELOPING STATISTICAL RELATIONSHIPS BETWEEN REGIONAL WEATHER AND RADIATION BUDGET ANOMALIES. THE EARTH RADIATION BUDGET EXPERIMENTS WILL BE FLOWN ON BOTH NOAA AND ERBS SATELLITES TO MEASURE REGIONAL RADIATION BUDGETS AND EQUATOR-TO-POLE GRADIENTS OF NET RADIATION. THE EARTH RADIATION BUDGET INSTRUMENT (ERBI) CONSISTS OF EIGHT CHANNELS DISTRIBUTION WITHIN TWO INSTRUMENT PACKAGES: THE WIDE AND MEDIUM FIELD OF VIEW INSTRUMENT (W/MFOV) AND THE SCANNER INSTRUMENT. THE W/MFOV IS A FIVE CHANNEL RADIOMETER. FOUR CHANNELS ARE PRIMARILY EARTH-VIEWING, BUT UPON COMMAND CAN BE POINTED TOWARD THE SUN FOR PERIODIC CALIBRATION. THE FIFTH CHANNEL IS FIXED FOR CONTINUOUS OBSERVATION OF THE SUN FOR CALIBRATION. TWO OF THE FOUR GIMBALED SENSORS ARE WIDE-ANGLED AND VIEW THE ENTIRE EARTH FROM LIMB TO LIMB, APPROXIMATELY 177 DEG FOR TIROS-N AND 135 DEG FOR ERBS-A. THESE DETECTORS HAVE BROADBAND SPECTRAL RESPONSES VARYING FROM 0.2 MICROMETERS TO OVER 50 MICROMETERS. CHANNEL 1 MAKES TOTAL RADIATION MEASUREMENTS WHILE CHANNEL 2, WITH ITS FILTER ATTACHED, MAKES MEASUREMENTS OVER THE SHORTWAVE SPECTRAL BAND CHARACTERIZED BY THE SUPRASIL-W DOME FILTER WHICH CUTS OFF AT 5 MICROMETERS. THE REMAINING TWO GIMBALED SENSORS ARE MEDIUM FIELD OF VIEW CHANNELS WITH A 66-DEG FIELD OF VIEW FOR TIROS-N AND 88 DEG FOR ERBS-A. EQUIVALENT TO A TEXAS-SIZE FOOTPRINT. CHANNEL 3 MEASURES TOTAL RADIATION WHILE CHANNEL 4, PLACED UNDER A SUPRASIL-W DOME, MEASURES THE SHORTWAVE SPECTRAL BAND. THE EARTH-EMITTED LONGWAVE RADIATION COMPONENT IS DETERMINED BY SUBTRACTING THE SHORTWAVE CHANNEL FROM THE TOTAL CHANNEL. THE SOLAR CHANNEL (5) HAS A 10 DEG FIELD OF VIEW MEASURING THE TOTAL SOLAR SPECTRAL RANGE OF THE SUN. THE SCANNER INSTRUMENT IS A SMALL SPATIAL RESOLUTION (FOV EQUALS 3 DEG DIAMETER) SCANNING RADIOMETER CONTAINING THREE SEPARATE CHANNELS (6,7,8). CHANNEL 6 ISOLATES THE SHORTWAVE SPECTRAL INTERVAL (0.22 TO 5 MICROMETERS). CHANNEL 7 MEASURES THE LONGWAVE SPECTRAL REGION (5 TO 50 MICROMETERS), AND CHANNEL 8 (1.6 MICROMETERS) PROVIDES CLOUD IMAGERY TO AID IN ANALYZING CHANNEL 6 AND 7 DATA. ALL THREE SENSORS ARE LOCATED WITHIN A

CONTINUOUSLY ROTATING SCAN DRUM WHICH SCANS THE FOV ACROSS TRACK SEQUENTIALLY FROM HORIZON TO HORIZON AND FROM A SPACE VIEW FOR CALIBRATION. ADDITIONAL INFORMATION CAN BE OBTAINED FROM 'SYSTEM CONSIDERATIONS FOR AN EARTH RADIATION BUDGET SCANNING RADIOMETER,' AND 'THE EARTH RADIATION BUDGET SATELLITE SYSTEM OF THE EARLY 1980'S.'

----- NOAA-F, NESS STAFF-----

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER
(AVHRR)

NSSDC ID- NOAA-F -01 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE NOAA-F ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) IS A FOUR-CHANNEL SCANNING RADIOMETER CAPABLE OF PROVIDING GLOBAL DAYTIME AND NIGHTTIME SEA SURFACE TEMPERATURE, ICE, SNOW, AND CLOUD INFORMATION. THESE DATA ARE OBTAINED ON A DAILY BASIS FOR USE IN WEATHER ANALYSIS AND FORECASTING. THE MULTISPECTRAL RADIOMETER OPERATES IN THE SCANNING MODE AND MEASURES EMITTED AND REFLECTED RADIATION IN THE FOLLOWING SPECTRAL INTERVALS -- CHANNEL 1 (VISIBLE), 0.55 TO 0.9 MICROMETER, CHANNEL 2 (NEAR IR), 0.725 MICROMETER TO DETECTOR CUTOFF AROUND 1.3 MICROMETERS, CHANNEL 3 (IR WINDOW), 10.5 TO 11.5 MICROMETERS, AND CHANNEL 4 (IR WINDOW), 3.55 TO 3.93 MICROMETERS. ALL FOUR CHANNELS HAVE A SPATIAL RESOLUTION OF 1.1 KM, AND THE TWO IR WINDOW CHANNELS HAVE A THERMAL RESOLUTION OF 0.12 K AT 300 K. THE AVHRR IS CAPABLE OF OPERATING IN BOTH REAL-TIME OR RECORDED MODES. REAL-TIME OR DIRECT READOUT DATA ARE TRANSMITTED TO GROUND STATIONS BOTH AT LOW (4 KM) RESOLUTION VIA AUTOMATIC PICTURE TRANSMISSION (APT) AND AT HIGH (1 KM) RESOLUTION VIA HIGH RESOLUTION PICTURE TRANSMISSION (HRPT). DATA RECORDED ON BOARD ARE AVAILABLE FOR CENTRAL PROCESSING. THEY INCLUDE GLOBAL AREA COVERAGE (GAC) DATA, HAVE A RESOLUTION OF 4 KM, AND LOCAL AREA COVERAGE (LAC) DATA, WHICH CONTAINS DATA FROM SELECTED PORTIONS OF EACH ORBIT WITH A 1 KM RESOLUTION. IDENTICAL EXPERIMENTS ARE FLOWN ON THE OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-F, NESS STAFF-----

INVESTIGATION NAME- OPERATIONAL VERTICAL SOUNDER

NSSDC ID- NOAA-F -02 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE NOAA-F OPERATIONAL SOUNDER CONSISTS OF THREE INSTRUMENTS DESIGNED TO DETERMINE RADIANCES NEEDED TO CALCULATE TEMPERATURE AND HUMIDITY PROFILES OF THE ATMOSPHERE FROM THE SURFACE TO THE STRATOSPHERE (APPROXIMATELY 1 MB). THE FIRST INSTRUMENT, THE BASIC SOUNDING UNIT (BSU), HAS 14 CHANNELS AND MAKES MEASUREMENTS IN THE FOLLOWING SPECTRAL INTERVALS -- CHANNEL 1 - THE 3.7-MICROMETER WINDOW REGION, CHANNEL 2 - THE 4.3-MICROMETER CO2 BAND, CHANNEL 3 - THE 9.7-MICROMETER OZONE BAND, CHANNEL 4 - THE 11.1-MICROMETER WINDOW REGION, CHANNELS 5 THROUGH 11 - THE 15-MICROMETER CO2 BAND (13.3, 13.6, 14.0, 14.3, 14.5, 14.75, AND 15.0), AND CHANNELS 12 THROUGH 14 - THE 18-MICROMETER ROTATIONAL WATER VAPOR BANDS (18.8, 23.15, AND 29.4). THE SECOND INSTRUMENT, THE STRATOSPHERIC SOUNDING UNIT, HAS THREE CHANNELS OPERATING AT 14.97 MICROMETERS USING SELECTIVE ABSORPTION BY PASSING THE INCOMING RADIATION THROUGH THREE PRESSURE MODULATED CELLS CONTAINING CO2. THE THIRD INSTRUMENT, THE MICROWAVE SOUNDING UNIT, HAS FOUR CHANNELS OPERATING IN THE 50- TO 60-GHZ OXYGEN BAND (50.3, 53.7, 55.0, AND 57.9) TO OBTAIN TEMPERATURE PROFILES WHICH ARE FREE OF CLOUD INTERFERENCE. THE INSTRUMENTS ARE CROSS-COURSE SCANNING DEVICES UTILIZING A STEP TO PROVIDE A TRAVERSE SCAN WHILE THE ORBITAL MOTION OF THE SATELLITE PROVIDES SCANNING IN THE ORTHOGONAL DIRECTION. SIMILAR EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-F, NESS STAFF-----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)

NSSDC ID- NOAA-F -03 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS) ON NOAA-F IS DESIGNED TO MEET THE METEOROLOGICAL DATA NEEDS OF THE UNITED STATES AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP). THE SYSTEM RECEIVES LOW DUTY CYCLE TRANSMISSIONS OF METEOROLOGICAL OBSERVATIONS FROM FREE-FLOATING BALLOONS, OCEAN BUOYS, OTHER SATELLITES, AND FIXED GROUND-BASED SENSOR PLATFORMS DISTRIBUTED AROUND THE GLOBE. THESE OBSERVATIONS ARE ORGANIZED ON BOARD THE SPACECRAFT AND RETRANSMITTED WHEN THE SPACECRAFT COMES IN RANGE OF A COMMAND AND DATA ACQUISITION (CDA) STATION. FOR FREE-MOVING BALLOONS, THE DOPPLER FREQUENCY SHIFT OF THE TRANSMITTED SIGNAL IS OBSERVED TO CALCULATE THE LOCATION OF THE BALLOONS. THE DCS IS EXPECTED, FOR A MOVING SENSOR PLATFORM, TO HAVE A LOCATION ACCURACY OF 5 TO 8 KM RMS, AND A VELOCITY ACCURACY OF 1 TO 1.6 M/S. THIS SYSTEM HAS THE CAPABILITY OF ACQUIRING DATA FROM UP TO 2000 PLATFORMS PER DAY. IDENTICAL EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-F, WILLIAMS-----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NSSDC ID- NOAA-F -04 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS	NOAA-ERL
OI - H.H. SAUER	NOAA-ERL
OI - C.O. BOSTROM	APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT IS AN EXTENSION OF THE SOLAR PROTON MONITORING EXPERIMENT FLOWN ON THE ITOS SPACECRAFT SERIES. THE EXPERIMENT PACKAGE CONSISTS OF FOUR DETECTOR SYSTEMS AND A DATA PROCESSING UNIT. THE LOW-ENERGY PROTON ALPHA TELESCOPE (LEPAT) SEPARATELY MEASURES IN FIVE ENERGY RANGES BOTH PROTONS BETWEEN 150 KEV AND 40 MEV AND ALPHA PARTICLES BETWEEN 150 KEV/N AND 25 MEV/N. THERE ARE TWO LEPATS VIEWING IN THE ANTI-SUN AND ANTI-EARTH DIRECTIONS WITH 60-DEG VIEWING CONES. THE PROTON OMNIDIRECTIONAL DETECTOR (POD) MEASURES PROTONS ABOVE 10, 30, AND 60 MEV, ELECTRONS ABOVE 140 KEV, AND PROTONS AND ELECTRONS (INSEPARABLE) ABOVE 750 KEV. THE HIGH-ENERGY PROTON ALPHA TELESCOPE (HEPAT) HAS A 50-DEG VIEWING CONE, VIEWS IN THE ANTI-EARTH DIRECTION, AND MEASURES PROTONS ABOVE 400 MEV AND PROTONS AND ALPHA PARTICLES ABOVE 600 AND 1000 MEV/N. THE TOTAL ENERGY DETECTOR (TED) MEASURES TOTAL ENERGY ABOVE 1 KEV.

***** NOAA-G*****

SPACECRAFT COMMON NAME- NOAA-G
ALTERNATE NAMES-

NSSDC ID- NOAA-G

LAUNCH DATE- 02/00/84 WEIGHT- 588.9 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS F

SPONSORING COUNTRY/AGENCY	
UNITED STATES	NOAA-NESS
UNITED STATES	NASA-OSTA

PLANNED ORBIT PARAMETERS	
ORBIT TYPE- GEOCENTRIC	
ORBIT PERIOD- 101.5 MIN	INCLINATION- 98.7 DEG
PERIAPSIS- 833. KM ALT	APOAPSIS- 833. KM ALT

PERSONNEL	
MG - M.L. GARRACZ	NASA HEADQUARTERS
PM - G.A. BRANCHFLOWER	NASA-GSFC
PS - A. ARKING	NASA-GSFC

BRIEF DESCRIPTION

NOAA-G IS THE SEVENTH IN A SERIES OF THIRD-GENERATION, OPERATIONAL METEOROLOGICAL SATELLITES FOR USE IN THE NATIONAL OPERATIONAL ENVIRONMENTAL SATELLITE SUBSYSTEM (NOESS) TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP) DURING 1978-84. THE SATELLITE DESIGN PROVIDES AN ECONOMICAL AND STABLE SUN-SYNCHRONOUS PLATFORM FOR ADVANCED OPERATIONAL INSTRUMENTS TO MEASURE THE EARTH'S ATMOSPHERE, ITS SURFACE AND CLOUD COVER, AND THE NEAR-SPACE ENVIRONMENT. PRIMARY SENSORS INCLUDE AN ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) FOR OBSERVING DAYTIME AND NIGHTTIME GLOBAL CLOUD COVER AND AN OPERATIONAL VERTICAL SOUNDER FOR OBTAINING TEMPERATURE AND WATER VAPOR PROFILES THROUGH THE EARTH'S ATMOSPHERE. SECONDARY EXPERIMENTS CONSIST OF A SPACE ENVIRONMENT MONITOR (SEM), WHICH MEASURES THE PROTON AND ELECTRON FLUX NEAR THE EARTH, AND A DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS), WHICH PROCESS AND RELAY TO CENTRAL DATA ACQUISITION STATIONS, VARIOUS METEOROLOGICAL DATA RECEIVED FROM FREE-FLOATING BALLOONS AND OCEAN BUOYS DISTRIBUTED AROUND THE GLOBE. THE SATELLITE IS BASED UPON THE BLOCK 50 SPACECRAFT BUS DEVELOPED FOR THE US AIR FORCE, AND IS CAPABLE OF MAINTAINING AN EARTH-POINTING ACCURACY OF BETTER THAN PLUS OR MINUS 0.1 DEG WITH A MOTION RATE OF LESS THAN 0.035 DEG/SEC.

----- NOAA-G, BROOME-----

INVESTIGATION NAME- EARTH RADIATION BUDGET INSTRUMENT (ERBI)

NSSDC ID- NOAA-G -05 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
TL - G.C. BROOME NASA-LARC
TM - A.A. RUDMANN NASA-GSFC

BRIEF DESCRIPTION

THE EARTH RADIATION BUDGET SATELLITE SYSTEM (ERBSS) IS DESIGNED TO MEASURE THE ENERGY EXCHANGE BETWEEN THE EARTH-ATMOSPHERE SYSTEM AND SPACE. THESE MEASUREMENTS ARE IMPORTANT FOR CLIMATE PREDICTION AND IN DEVELOPING STATISTICAL RELATIONSHIPS BETWEEN REGIONAL WEATHER AND RADIATION BUDGET ANOMALIES. THE EARTH RADIATION BUDGET EXPERIMENTS WILL BE FLOWN ON BOTH NOAA AND ERBS SATELLITES TO MEASURE REGIONAL RADIATION BUDGETS AND EQUATOR-TO-POLE GRADIENTS OF NET RADIATION. THE EARTH RADIATION BUDGET INSTRUMENT (ERBI) CONSISTS OF EIGHT CHANNELS DISTRIBUTED WITHIN TWO INSTRUMENT PACKAGES: THE WIDE AND MEDIUM FIELD OF VIEW INSTRUMENT (W/MFOV) AND THE SCANNER INSTRUMENT. THE W/MFOV IS A FIVE CHANNEL RADIOMETER. FOUR CHANNELS ARE PRIMARILY EARTH-VIEWING, BUT UPON COMMAND CAN BE POINTEW TOWARD THE SUN FOR PERIODIC CALIBRATION. THE FIFTH CHANNEL IS FIXED FOR CONTINUOUS OBSERVATION OF THE SUN FOR CALIBRATION. TWO OF THE FOUR GIMBALED SENSORS ARE WIDE-ANGLED AND VIEW THE ENTIRE EARTH FROM LIMB TO LIMB, APPROXIMATELY 177 DEG FOR TIROS-N AND 135 DEG FOR ERBS-A. THESE DETECTORS HAVE BROADBAND SPECTRAL RESPONSES VARYING FROM 0.2 MICROMETERS TO OVER 50 MICROMETERS. CHANNEL 1 MAKES TOTAL RADIATION MEASUREMENTS WHILE CHANNEL 2, WITH ITS FILTER ATTACHED, MAKES MEASUREMENTS OVER THE SHORTWAVE SPECTRAL BAND CHARACTERIZED BY THE SUPRASIL-W DOME FILTER WHICH CUTS OFF AT 5 MICROMETERS. THE REMAINING TWO GIMBALED SENSORS ARE MEDIUM FIELD OF VIEW CHANNELS WITH A 66-DEG FIELD OF VIEW FOR TIROS-N AND 88 DEG FOR ERBS-A, EQUIVALENT TO A TEXAS-SIZE FOOTPRINT. CHANNEL 3 MEASURES TOTAL RADIATION WHILE CHANNEL 4, PLACED UNDER A SUPRASIL-W DOME, MEASURES THE SHORTWAVE SPECTRAL BAND. THE EARTH-EMITTED LONGWAVE RADIATION COMPONENT IS DETERMINED BY SUBTRACTING THE SHORTWAVE CHANNEL FROM THE TOTAL CHANNEL. THE SOLAR CHANNEL (5) HAS A 10-DEG FIELD OF VIEW MEASURING THE TOTAL SOLAR SPECTRAL RANGE OF THE SUN. THE SCANNER INSTRUMENT IS A SMALL SPATIAL RESOLUTION (FOV EQUALS 3 DEG DIAMETER) SCANNING RADIOMETER CONTAINING THREE SEPARATE CHANNELS. (6,7,8). CHANNEL 6 ISOLATES THE SHORTWAVE SPECTRAL INTERVAL (0.2 TO 5 MICROMETERS). CHANNEL 7 MEASURES THE LONGWAVE SPECTRAL REGION (5 TO 50 MICROMETERS), AND CHANNEL 8 (1.6 MICROMETERS) PROVIDES CLOUD IMAGERY TO AID IN ANALYZING CHANNEL 6 AND 7 DATA. ALL THREE SENSORS ARE LOCATED WITHIN A CONTINUOUSLY ROTATING SCAN DRUM WHICH SCANS THE FOV ACROSS TRACK SEQUENTIALLY FROM HORIZON TO HORIZON AND FROM A SPACE VIEW FOR CALIBRATION. ADDITIONAL INFORMATION CAN BE OBTAINED FROM 'SYSTEM CONSIDERATIONS FOR AN EARTH RADIATION BUDGET SCANNING RADIOMETER,' AND 'THE EARTH RADIATION BUDGET SATELLITE SYSTEM OF THE EARLY 1980'S.'

----- NOAA-G, NESS STAFF-----

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)

NSSDC ID- NOAA-G -01 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE NOAA-G ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) IS A FOUR-CHANNEL SCANNING RADIOMETER CAPABLE OF PROVIDING GLOBAL DAYTIME AND NIGHTTIME SEA SURFACE TEMPERATURE, ICE, SNOW, AND CLOUD INFORMATION. THESE DATA ARE OBTAINED ON A DAILY BASIS FOR USE IN WEATHER ANALYSIS AND FORECASTING. THE MULTISPECTRAL RADIOMETER OPERATES IN THE SCANNING MODE AND MEASURES EMITTED AND REFLECTED RADIATION IN THE FOLLOWING SPECTRAL INTERVALS -- CHANNEL 1 (VISIBLE), 0.55 TO 0.9 MICROMETER, CHANNEL 2 (NEAR IR), 0.725 MICROMETER TO DETECTOR CUTOFF AROUND 1.3 MICROMETER, CHANNEL 3 (IR WINDOW), 10.5 TO 11.5 MICROMETER, AND CHANNEL 4 (IR WINDOW), 3.55 TO 3.93 MICROMETER. ALL FOUR CHANNELS HAVE A SPATIAL RESOLUTION OF 1.1 KM, AND THE TWO IR WINDOW CHANNELS HAVE A THERMAL RESOLUTION OF 0.12 DEG K AT 300 DEG K. THE AVHRR IS CAPABLE OF OPERATING IN BOTH REAL-TIME OR RECORDED MODES. REAL-TIME OR DIRECT READOUT DATA ARE TRANSMITTED TO GROUND STATIONS BOTH AT LOW (4 KM) RESOLUTION VIA AUTOMATIC PICTURE TRANSMISSION (APT) AND AT HIGH (1 KM) RESOLUTION VIA HIGH RESOLUTION PICTURE TRANSMISSION (HRPT). DATA RECORDED ON BOARD ARE AVAILABLE FOR CENTRAL PROCESSING. THEY INCLUDE GLOBAL AREA COVERAGE (GAC) DATA, HAVE A RESOLUTION OF 4 KM, AND LOCAL AREA COVERAGE (LAC) DATA, WHICH WILL CONTAIN DATA FROM SELECTED PORTIONS OF EACH ORBIT WITH A 1 KM RESOLUTION. IDENTICAL EXPERIMENTS ARE FLOWN ON THE OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-G, NESS STAFF-----

INVESTIGATION NAME- OPERATIONAL VERTICAL SOUNDER

NSSDC ID- NOAA-G -02 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE NOAA-G OPERATIONAL SOUNDER CONSISTS OF THREE INSTRUMENTS DESIGNED TO DETERMINE RADIANCES NEEDED TO CALCULATE TEMPERATURE AND HUMIDITY PROFILES OF THE ATMOSPHERE FROM THE SURFACE TO THE STRATOSPHERE (APPROXIMATELY 1 MB). THE FIRST INSTRUMENT, THE BASIC SOUNDING UNIT (BSU), HAS 14 CHANNELS AND MAKES MEASUREMENTS IN THE FOLLOWING SPECTRAL INTERVALS -- CHANNEL 1 - THE 3.7 MICROMETER WINDOW REGION, CHANNEL 2 - THE 4.3 MICROMETER CARBON DIOXIDE BAND, CHANNEL 3 - THE 9.7 MICROMETER OZONE BAND, CHANNEL 4 - THE 11.1 MICROMETER WINDOW REGION, CHANNELS 5 THROUGH 11 - THE 15 MICROMETER CARBON DIOXIDE BAND (13.3, 13.6, 14.0, 14.3, 14.5, 14.75, AND 15.0), AND CHANNELS 12 THROUGH 14 - THE 18 TO 30 MICROMETER ROTATIONAL WATER VAPOR BANDS (18.8, 23.15, AND 29.4). THE SECOND INSTRUMENT, THE STRATOSPHERIC SOUNDING UNIT, HAS THREE CHANNELS OPERATING AT 14.97 MICROMETERS USING SELECTIVE ABSORPTION BY PASSING THE INCOMING RADIATION THROUGH THREE PRESSURE-MODULATED CELLS CONTAINING CARBON DIOXIDE. THE THIRD INSTRUMENT, THE MICROWAVE SOUNDING UNIT, HAS FOUR CHANNELS OPERATING IN THE 50 TO 60 GHZ OXYGEN BAND (50.3, 53.7, 55.0, AND 57.9) TO OBTAIN TEMPERATURE PROFILES WHICH ARE FREE OF CLOUD INTERFERENCE. THE INSTRUMENTS ARE CROSS-COURSE SCANNING DEVICES UTILIZING A STEP SCAN TO PROVIDE A TRAVERSE SCAN WHILE THE ORBITAL MOTION OF THE SATELLITE PROVIDES SCANNING IN THE ORTHOGONAL DIRECTION. SIMILAR EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-G, NESS STAFF-----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)

NSSDC ID- NOAA-G -03 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS) ON NOAA-G IS DESIGNED TO MEET THE METEOROLOGICAL DATA NEEDS OF THE UNITED STATES AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP). THE SYSTEM RECEIVES LOW-DUTY CYCLE TRANSMISSIONS OF METEOROLOGICAL OBSERVATIONS FROM FREE-FLOATING BALLOONS, OCEAN BUOYS, OTHER SATELLITES, AND FIXED GROUND-BASED SENSOR PLATFORMS DISTRIBUTED AROUND THE GLOBE. THESE OBSERVATIONS ARE ORGANIZED ON BOARD THE SPACECRAFT AND RETRANSMITTED WHEN THE SPACECRAFT COMES IN RANGE OF A COMMAND AND DATA ACQUISITION (CDA) STATION. FOR FREE-MOVING BALLOONS, THE DOPPLER FREQUENCY SHIFT OF THE TRANSMITTED SIGNAL IS OBSERVED TO CALCULATE THE LOCATION OF THE BALLOONS. THE DCS IS EXPECTED, FOR A MOVING SENSOR PLATFORM, TO HAVE A LOCATION ACCURACY OF 5 TO 8 KM RMS, AND A VELOCITY ACCURACY OF 1 TO 1.6 M/S. THIS SYSTEM HAS THE CAPABILITY OF ACQUIRING DATA FROM UP TO 2000 PLATFORMS PER DAY. IDENTICAL EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-G, WILLIAMS-----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NSSDC ID- NOAA-G -04 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - H.H. SAUER NOAA-ERL
OI - C.O. BOSTROM APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT IS AN EXTENSION OF THE SOLAR PROTON MONITORING EXPERIMENT FLOWN ON THE TIROS SPACECRAFT SERIES. THE EXPERIMENT PACKAGE CONSISTS OF FOUR DETECTOR SYSTEMS AND A DATA PROCESSING UNIT. THE LOW-ENERGY PROTON ALPHA TELESCOPE (LEPAT) SEPARATELY MEASURES IN FIVE ENERGY RANGES BOTH PROTONS BETWEEN 150 KEV AND 40 MEV AND ALPHA PARTICLES BETWEEN 150 KEV/N AND 25 MEV/N. THERE ARE TWO LEPATS VIEWING IN THE ANTI-SUN AND ANTI-EARTH DIRECTIONS WITH 60-DEG VIEWING CONES. THE PROTON OMNIDIRECTIONAL DETECTOR (POD) MEASURES PROTONS ABOVE 10, 30, AND 60 MEV, ELECTRONS ABOVE 140 KEV, AND PROTONS AND ELECTRONS (INSEPARABLE) ABOVE 750 KEV. THE HIGH-ENERGY PROTON ALPHA TELESCOPE (HEPAT) HAS A 50-DEG VIEWING CONE, VIEWS IN THE ANTI-EARTH DIRECTION, AND MEASURES PROTONS ABOVE 400 MEV AND PROTONS AND ALPHA PARTICLES ABOVE 600 AND 1000 MEV/N. THE TOTAL ENERGY DETECTOR (TED) MEASURES TOTAL ENERGY ABOVE 1 KEV.

***** OSS-1*****

SPACECRAFT COMMON NAME- OSS-1
ALTERNATE NAMES- SHUTTLE OFT-4

NSSDC ID- SHOFT-4

LAUNCH DATE- 02/14/81 WEIGHT- 3730. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 90. MIN INCLINATION- 38. DEG
PERIAPSIS- 300. KM ALT APOAPSIS- 300. KM ALT

PERSONNEL
MM - K. KISSIN NASA-GSFC
MS - W.M. NEUPERT NASA-GSFC

BRIEF DESCRIPTION
SIX OF THE SEVEN EXPERIMENTS THAT MAKE UP THE OSS-1 PAYLOAD ON STS-5, OSS-1-01 TO OSS-1-06 ARE MOUNTED ON THE SPACELAB PALLET AND THE SEVENTH EXPERIMENT, OSS-1-07, IS MOUNTED IN THE MID DECK DIRECTLY BELOW THE ORBITER CABIN. THE SPACELAB PALLET IS TRANSPORTED TO AND FROM ORBIT IN THE CARGO BAY OF THE SPACE SHUTTLE ORBITER, AND REMAINS THERE THROUGHOUT THE 7-DAY FLIGHT. THE PARAMETERS MEASURED BY THE PAYLOAD INCLUDE: (1) PLASMA, WAVES, AND FIELDS THAT EXIST IN THE AMBIENT ATMOSPHERE, THAT RESULT FROM PERTURBATIONS INDUCED BY THE MOTION OF THE ORBITER THROUGH THE MAGNETIZED PLASMA, AND THAT RESULT FROM 'INTERFERENCE' BECAUSE OF THE ORBITER/SPACELAB OPERATIONS SYSTEMS; (2) POLARIZATION IN SOLAR X-RAY BURSTS; (3) SOLAR FLUX IN THE WAVELENGTH RANGE 120-400 NANOMETERS; (4) ELECTRICAL CHARGING PROPERTIES OF THE ORBITER VEHICLE; (5) THERMAL PROPERTIES OF THE CANISTER EXPERIMENT; AND (6) OPTICAL PROPERTIES OF THE SHUTTLE-INDUCED ATMOSPHERES. IN ADDITION, THERE ARE MEASUREMENTS OF THE INFLUENCE OF WEIGHTLESSNESS ON THE LIGNIFICATION IN DEVELOPING PLANT SEEDLINGS.

----- OSS-1, BANKS-----

INVESTIGATION NAME- VEHICLE CHARGING AND POTENTIAL
EXPERIMENT

NSSDC ID- SHOFT-4-04 INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
TECHNOLOGY
PARTICLES AND FIELDS

PERSONNEL
PI - P.M. BANKS UTAH STATE U
OI - W.J. RAITT UTAH STATE U
OI - P.R. WILLIAMSON UTAH STATE U
OI - T. ODAYASHI U OF TOKYO

BRIEF DESCRIPTION
THE OBJECTIVES OF THE VEHICLE CHARGING AND POTENTIAL EXPERIMENT ARE TO: (1) DETERMINE ELECTRIC POTENTIAL CHANGES ASSOCIATED WITH ORBITER AND EXPERIMENT OPERATION, (2) DETERMINE THE ELECTRICAL CHARGING PROPERTIES OF THE ORBITER VEHICLE, (3) DETERMINE ELECTRIC POTENTIAL CHANGES ARISING FROM ACTIVE ELECTRON EMISSION, (4) DETERMINE ELECTRICAL PROCESSES ASSOCIATED WITH CHARGING AND DISCHARGING OF VEHICLE DIELECTRIC SURFACES, (5) ASSESS THE ELECTRICAL RESPONSE OF THE VEHICLE TO LOW LEVELS OF ELECTRON EMISSION, (6) DOCUMENT THE OPERATION OF A LOW POWER ELECTRON ACCELERATOR IN THE ORBITER ENVIRONMENT, AND (7) EVALUATE THE SUITABILITY OF THE ORBITER BAY FOR IN SITU PLASMA MEASUREMENTS. TO ACHIEVE THESE OBJECTIVES THE FOLLOWING INSTRUMENTS ARE FLOWN: (1) CHARGE AND CURRENT PROBES (CCP) TO MEASURE VEHICLE RETURN CURRENTS AND DIELECTRIC CHARGES AT TWO LOCATIONS IN THE BAY, (2) SPHERICAL RETARDING POTENTIAL ANALYZER/LANGMUIR PROBE (SRPA/LP) TO MEASURE VEHICLE POTENTIAL RELATIVE TO THE PLASMA, ELECTRON DENSITY, AND PLASMA TEMPERATURE; AND (3) A FAST PULSE ELECTRON GUN (FPEG) TO PROVIDE ELECTRON EMISSION WITH SHORT (100 NANSECONDS) PULSES AND CAPABLE OF DC OPERATION FOR EXTENDED PERIODS OF TIME. THE GUN OPERATES ON A CURRENT OF 0.1 AMP AND A VOLTAGE OF 1 KV.

----- OSS-1, BRUECKNER-----

INVESTIGATION NAME- SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE
MONITOR

NSSDC ID- SHOFT-4-03 INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - G.E. BRUECKNER
OI - J.D.F. BARTOE

US NAVAL RESEARCH LAB
US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
THE OBJECTIVE OF THE 'SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR' EXPERIMENT IS TO MONITOR SOLAR SPECTRAL IRRADIANCE IN THE WAVELENGTH REGION 120-400 NANOMETERS. SPECIFICALLY, IT IS EXPECTED TO: (1) DETERMINE SOLAR FLUXES TO A HIGH DEGREE OF ACCURACY, (2) DETERMINE THE ENERGY BALANCE IN THE 120 TO 300-NANOMETER REGION BY MEASURING SOLAR ULTRAVIOLET FLUX ABSORPTION, (3) LOOK FOR INDICATIONS THAT THE SOLAR ULTRAVIOLET OUTPUT BELOW 210 NANOMETERS IS VARIABLE IN THE CONTINUUM, (4) CONTRIBUTE TO A BETTER MODELING OF THE SUN'S ATMOSPHERE, (5) MERGE THE 300- TO 400-NANOMETERS WAVELENGTH REGION MEASUREMENTS WITH HIGH-ACCURACY GROUND-BASED MEASUREMENTS. THE INSTRUMENTATION CONSISTS OF TWO DOUBLE-DISPERSION SCANNING SPECTROMETERS, SEVEN DETECTORS, AND AN ULTRAVIOLET CALIBRATION SOURCE. THE SPECTROMETERS ARE SUN-POINTED AND HAVE A PLUS OR MINUS 0.5-DEG FIELD OF VIEW. ONE SPECTROMETER IS USED ALMOST CONTINUOUSLY DURING THE DAYLIGHT PORTION OF EACH SOLAR-POINTED ORBIT TO MEASURE THE SHORT TIME VARIATIONS OF THE SOLAR ULTRAVIOLET FLUX. THE SECOND SPECTROMETER IS USED ONLY ONCE A DAY TO TRACK ANY CHANGE IN SENSITIVITY OF THE FIRST SPECTROMETER. SIMILARLY, TWO OF THE FIVE PHOTODIODES ARE USED ONLY ONCE A DAY. A DEUTERIUM LAMP IS USED AS THE TRANSFER STANDARD SOURCE FOR DAILY IN-FLIGHT CALIBRATION AND STABILITY TRACKING OF BOTH SPECTROMETERS AND ALL SEVEN DETECTORS.

----- OSS-1, COWLES-----

INVESTIGATION NAME- INFLUENCE OF WEIGHTLESSNESS OF
LIGNIFICATION OF PLANT SEEDLINGS

NSSDC ID- SHOFT-4-07 INVESTIGATIVE PROGRAM
CODE SB
INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - J.R. COWLES U OF HOUSTON
OI - H.W. SCHELD U OF HOUSTON

BRIEF DESCRIPTION
AN OBJECTIVE OF THE STUDY OF INFLUENCE OF WEIGHTLESSNESS ON LIGNIFICATION IN DEVELOPING PLANT SEEDLINGS EXPERIMENT IS TO USE THE FLIGHT DATA TO PROVIDE CONFIRMATION OR REJECTION OF THE HYPOTHESIS THAT GRAVITY EXERTS A POSITIVE CONTROL UPON THE PATHWAY OF LIGNIFICATION, AND THAT THERE IS A SYNERGISTIC INTERACTION WITH THE ATMOSPHERE. A SERIES OF COMPLEMENTARY EXPERIMENTS WITH PASSIVE EXPOSURE OF COMPACT PLANT SYSTEMS IN A SMALL GROWTH CHAMBER WERE FLOWN. MEASUREMENTS ARE MADE OF LIGNIFICATION AND ASSOCIATED ENZYMES, AND OF GASEOUS METABOLITES. THE EXPERIMENT PROVIDES EXPERIENCE WITH, AND DEVELOPMENT OF TECHNIQUES AND HARDWARE FOR, PLANT HANDLING IN SPACE.

----- OSS-1, NOVICK-----

INVESTIGATION NAME- SOLAR FLARE X-RAY POLARIMETER EXPERIMENT

NSSDC ID- SHOFT-4-02 INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
SOLAR PHYSICS

PERSONNEL
PI - R. NOVICK COLUMBIA U
OI - R.S. WOLFF COLUMBIA U

BRIEF DESCRIPTION
THE OBJECTIVES OF THE SOLAR FLARE X-RAY POLARIMETER EXPERIMENT ARE TO MEASURE THE: (1) DEGREE OF POLARIZATION IN SOLAR X-RAY BURSTS, (2) TEMPORAL DEPENDENCE OF THE X-RAY POLARIZATION, (3) ENERGY DEPENDENCE OF THE X-RAY POLARIZATION, AND (4) POLARIZATION ANGLE. IN ADDITION, THE CORRELATION OF THE X-RAY POLARIZATION WITH OTHER PHENOMENA ASSOCIATED WITH SOLAR FLARES IS STUDIED, AND THE SYSTEMATIC EFFECTS OF THE OPERATION OF THE INSTRUMENT IN A SATELLITE ENVIRONMENT IS EVALUATED. THE FLIGHT INSTRUMENT, A SCATTER BLOCK POLARIMETER, CONSISTS OF THREE DETECTORS MOUNTED IN AN EQUILATERAL CONFIGURATION. THERE ARE FOUR COUNTERS AND FOUR RECTANGULAR LITHIUM SCATTERING BLOCKS PER DETECTOR. THE POLARIMETER IS POINTED AT THE SUN DURING THE OCCURRENCE OF SOLAR FLARES AND WHEN SUN-POINTED IT HAS A THREE-DEG FIELD OF VIEW. THE INSTRUMENT USES THE ANGULAR DEPENDENCE OF THE INCOHERENT SCATTERING CROSS SECTION OF ELECTRONS TO DETECT THE DIRECTION OF THE INCIDENT PHOTON'S ELECTRIC VECTOR. THE DIFFERENCE IN COUNTING RATES IN DETECTORS AT DIFFERENT AZIMUTHS RELATIVE TO THE EARTH-SUN LINE IS THE SIGNATURE OF THE X-RAY POLARIZATION.

----- OSS-1, OLLENDORF-----

INVESTIGATION NAME- THERMAL CANISTER EXPERIMENT

NSSDC ID- SHOFT-4-05

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - S. OLLENDORF

NASA-GSFC

BRIEF DESCRIPTION

THE OBJECTIVES OF THE THERMAL CANISTER EXPERIMENT ARE TO:
(1) DEMONSTRATE UNDER THE DIVERSE THERMAL ENVIRONMENTS OF THE SPACE SHUTTLE THE PERFORMANCE OF A THERMAL CANISTER UTILIZING FEEDBACK VARIABLE CONDUCTANCE HEATPIPES, AND (2) DEMONSTRATE THE ABILITY OF THE SYSTEM TO MAINTAIN TEMPERATURE CONTROL WITHIN NARROW LIMITS BY VARYING INTERNAL POWER DISSIPATION OVER A WIDE RANGE AND MONITORING THERMAL BEHAVIOR. TO ACHIEVE THESE OBJECTIVES A CANISTER 1 M X 1 M X 3 M AND WEIGHING 160 KG, CANISTER HEAT PIPES, VARIABLE CONDUCTANCE HEAT PIPES, AND A RADIATOR AND RADIATOR HEAT PIPES ARE FLOWN. THE THERMAL CANISTER IS BUILT IN AS CLOSE A CONFIGURATION AS POSSIBLE TO THE FLIGHT APPLICATION AND MOUNTED ON A STRUCTURE TOGETHER WITH SUPPORT ELECTRONICS. HEATERS WITHIN THE CANISTER SIMULATE INSTRUMENT POWER DISSIPATION. CANISTERS DEVELOPED FOR FLIGHT INSTRUMENTS ARE A STANDARD INVENTORY ITEM FOR FUTURE USE AS REQUIRED.

----- OSS-1, SHAWHAN-----

INVESTIGATION NAME- PLASMA DIAGNOSTIC PACKAGE

NSSDC ID- SHOFT-4-01

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - S.D. SHAWHAN
01 - L.A. FRANK
01 - D.A. GURNETT
01 - N. D'ANGELO
01 - H.C. BRINTON

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NASA-GSFC

BRIEF DESCRIPTION

THE OBJECTIVES OF THE PLASMA DIAGNOSTIC PACKAGE (PDP) EXPERIMENT ARE TO: (1) STUDY THE ORBITER-MAGNETOPLASMA INTERACTIONS, (2) MAP THE LOCALIZED SOURCES OF ELECTRIC AND MAGNETIC FIELDS, AND (3) DEMONSTRATE THE OPERATION OF THE PDP PRIOR TO ITS FLIGHT ON SPACELAB 2. SPECIFICALLY, THE PDP MEASURES THE PLASMA, WAVES, AND FIELDS THAT EXIST IN THE AMBIENT IONOSPHERE, THAT RESULT FROM THE PERTURBATIONS INDUCED BY THE MOTION OF THE ORBITER THROUGH THE MAGNETIZED PLASMA, AND THAT RESULT FROM 'INTERFERENCE' BECAUSE OF THE ORBITER/SPACELAB OPERATION SYSTEM. THE ELECTROMAGNETIC INTERFERENCE AND PLASMA CONTAMINATION WITHIN THE ORBITER BAY ARE MAPPED BY USING THE REMOTE MANIPULATOR ARM TO SCAN THE PDP OVER THE BAY AREA. THE FOLLOWING INSTRUMENTS MAKE UP THE PDP: A QUADRISPHERICAL LOW ENERGY PROTON AND ELECTRON DIFFERENTIAL ENERGY ANALYZER (LEPDEA) TO MEASURE NONTHERMAL ELECTRON AND PROTON DISTRIBUTION FUNCTIONS FROM 2 EV TO 50 KEV, AN AC ELECTRIC WAVE ANALYZER TO MEASURE ELECTROMAGNETIC AND ELECTROSTATIC WAVES FROM 5 HZ TO 10 MHZ, AN AC MAGNETIC WAVE ANALYZER SEARCH COIL TO MEASURE MAGNETIC FIELDS AND ELECTROMAGNETIC WAVES FROM 5 HZ TO 20 KHZ, A DC ELECTRIC FIELD METER SPINNING DOUBLE PROBE TO MEASURE ELECTRIC FIELDS FROM 1.E-3 TO 1 V/M, AND A LANGMUIR PROBE TO MEASURE DENSITIES FROM 1.E4 TO 1.E7 PER CUBIC CM AND TEMPERATURES IN THE RANGE FROM 500 TO 5000 K.

----- OSS-1, WEINBERG-----

INVESTIGATION NAME- CHARACTERISTICS OF SHUTTLE/SPACELAB
INDUCED ATMOSPHERE

NSSDC ID- SHOFT-4-06

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY
ATMOSPHERIC PHYSICS

PERSONNEL

PI - J.L. WEINBERG

STATE U OF NEW YORK

BRIEF DESCRIPTION

THE OBJECTIVES OF THE CHARACTERISTICS OF SHUTTLE/SPACELAB INDUCED ATMOSPHERE EXPERIMENT ARE TO: (1) DETERMINE THE OPTICAL PROPERTIES OF THE SHUTTLE INDUCED ATMOSPHERES, (2) OBSERVE THE DIFFUSE ASTRONOMICAL BACKGROUND, AND (3) OBSERVE THE EARTH'S LIMB IN THE STUDY OF ATMOSPHERIC AEROSOLS. THE EXISTING SKYLAB PHOTOMETER/CAMERA SYSTEM ADAPTED TO BE PALLET MOUNTED IS USED. IT HAS A SELF-CONTAINED POINTING SYSTEM, AND AUTOMATIC SHUTDOWN AND START-UP PROVISIONS TO ALLOW MAXIMUM VIEWING TIME. THE INSTRUMENT CAN BE PROGRAMMED TO DO SKY SURVEY IN SEVERAL MODES. THE EXPERIMENT CYCLE IS SELECTABLE THROUGH AN AUTOMATIC PROGRAMMER.

***** SAN MARCO-D/L*****

SPACECRAFT COMMON NAME- SAN MARCO-D/L
ALTERNATE NAMES-

NSSDC ID- SM-DL

LAUNCH DATE- 09/15/81

WEIGHT- 200. KG

LAUNCH SITE- SAN MARCO PLATFORM, OFF COAST OF KENYA

LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY

ITALY
UNITED STATES

CRA
NASA-OSS

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 100. MIN
PERIAPSIS- 290. KM ALT

INCLINATION- 3. DEG
APOAPSIS- 1010. KM ALT

PERSONNEL

MG - F.W. GAETANO
SC - E. SCHMERLING
PM - R.S. TATUM
PS - N.W. SPENCER

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THIS SATELLITE IS A 96.5-CM-DIAMETER SPHERE WITH FOUR, 48-CM, CANTED MONOPOLE TELEMETRY ANTENNAS AND THREE ORTHOGONAL PAIRS OF ELECTRIC FIELD PROBE SENSORS (ONE PAIR ORIENTED ALONG THE SPACECRAFT SPIN AXIS). AN INTERNAL STRUCTURAL CYLINDER (26-CM DIAM) EXTENDS SLIGHTLY THROUGH THE SPHERE AND IS COINCIDENT WITH THE SATELLITE SPIN AXIS. A 30-CM-WIDE BELT AROUND THE SATELLITE EQUATOR, IS COVERED WITH 1792 SOLAR CELLS THAT, WITH 2 RECHARGEABLE BATTERIES, COMPRISES THE POWER SOURCE. THE SATELLITE EMPLOYS PASSIVE THERMAL CONTROL. ATTITUDE DATA ARE PROVIDED BY A SUN SENSOR AND A MAGNETOMETER. A MAGNETIC TORQUING SYSTEM IS USED TO CONTROL SPIN RATE AND SPACECRAFT ATTITUDE. A 50-MIN CAPACITY TAPE RECORDER IS ON BOARD, ALONG WITH FIVE EXPERIMENTS, -- (1) DRAG BALANCE, (2) AIRGLOW SPECTROMETER, (3) ION VELOCITY, (4) ELECTRIC FIELD METER, AND (5) WIND AND TEMPERATURE. THIS SPACECRAFT IS FLOWN TO STUDY RELATIONSHIPS BETWEEN SOLAR ACTIVITY AND METEOROLOGICAL PHENOMENA AND TO LOOK FOR LINKS BETWEEN TROPOSPHERIC AND THERMOSPHERIC PROCESSES.

----- SAN MARCO-D/L, BROGLIO-----

INVESTIGATION NAME- DRAG BALANCE AND AIR DENSITY

NSSDC ID- SM-DL -01

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL

PI - L. BROGLIO

NATL RES COUNC ITALY

BRIEF DESCRIPTION

THE DRAG BALANCE INSTRUMENT, WHICH IS AN INTEGRAL PART OF THE SATELLITE, CONSISTS OF AN INNER MASS, AN ELASTIC ELEMENT, AND AN OUTER SHELL. THE DRAG BALANCE IS THE CONNECTING ELASTIC ELEMENT BETWEEN THE OUTER LIGHT SHELL AND THE INNER HEAVY BODY. THE CENTER OF THE BALANCE IS LOCATED AT THE SATELLITE GEOMETRIC CENTER, OR THAT POINT WHICH IS THE GEOMETRIC CENTER BOTH OF THE INNER BODY AND THE SHELL. THIS INSTRUMENT MEASURES THE RELATIVE TRANSLATIONS BETWEEN THE SHELL AND THE INNER BODY BOTH IN VALUE AND DIRECTION, RESOLVING ANY RELATIVE TRANSLATION ALONG THREE MUTUALLY ORTHOGONAL AXES. THESE THREE AXES ARE FIXED TO THE BODY, ONE OF THEM BEING COINCIDENT WITH THE POLAR SYMMETRY AXIS OF THE SATELLITE. BEING FIXED TO THE SATELLITE, THE AXIS ROTATES WITH IT IN THE FREE-PRECESSION MOTION AROUND THE CENTER OF GRAVITY. THE BALANCE IS DESIGNED IN SUCH A WAY THAT THE MAXIMUM TRANSLATION BETWEEN THE SHELL AND THE DRUM IS GENERALLY OF THE ORDER OF 0.01 MM. IN MOST CASES THE DRAG FORCE AT THE ORBIT APOGEE IS NEGLIGIBLE. AS A CONSEQUENCE, THE APOGEE DATA ARE USED TO GET AN IN-FLIGHT CALIBRATION OF THE BALANCE. THUS, THE TRANSLATION OF THE ELASTIC SYSTEM IS CHANGED INTO VOLTAGES THAT ARE AMPLIFIED AND DEMODULATED TO OBTAIN DC SIGNALS.

----- SAN MARCO-D/L, HANSON-----

INVESTIGATION NAME- IVI-ION VELOCITY INSTRUMENT (PLANAR
RETARDING POTENTIAL ANALYZER)

NSSDC ID- SM-DL -03

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES

PERSONNEL

PI - W.B. HANSON

U OF TEXAS, DALLAS

BRIEF DESCRIPTION

THIS EXPERIMENT IS A PLANAR RETARDING POTENTIAL ANALYZER, DESIGNED TO OBTAIN MEASUREMENTS OF RELATIVE THERMAL-ION VELOCITY, PLASMA DENSITY, AND ION TEMPERATURE. THE ION ANGLE-OF-ARRIVAL CAN BE DETERMINED BY USE IN THE INSTRUMENT DESIGN OF A SQUARE APERTURE COLLIMATOR AND A SPLIT COLLECTOR. TOGETHER WITH KNOWLEDGE OF SPACECRAFT MOTION, THIS ALLOWS COMPUTATION OF THE THREE-DIMENSIONAL THERMAL-ION MOTION ALONG THE ORBITAL PATH. PLASMA DENSITY AND TEMPERATURE IS CALCULATED BY INTERPRETATION OF THE VOLTAGE-AMPERAGE PROFILE PRODUCED BY THE INSTRUMENT FOR A GIVEN IMPRESSED VOLTAGE PATTERN ON THE GRIDS AND COLLECTOR. ION VELOCITY MEASUREMENT IS PLANNED ONCE EACH SPACECRAFT SPIN PERIOD (10 S).

----- SAN MARCO-D/L, MAYNARD-----

INVESTIGATION NAME- 3-AXIS ELECTRIC FIELD

NSSDC ID- SM-DL -05

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES

PERSONNEL

PI - N.C. MAYNARD
OI - J.P. HEPPNERNASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT IS DESIGNED TO OBSERVE THE THREE COMPONENTS OF AMBIENT ELECTRIC FIELD OVER THE SATELLITE TRAJECTORY. THREE PAIRS, A PAIR FOR EACH COMPONENT, OF CYLINDRICAL PROBES ARE USED. A BODY IN A PLASMA ESTABLISHES A POTENTIAL RELATIVE TO THE PLASMA THAT MAINTAINS A CURRENT BALANCE. IF NO CURRENT IS DRAWN FROM THE BODY, ITS POTENTIAL DEPENDS ON THE POTENTIAL DIFFERENCES WITHIN THE PLASMA. FOR EACH COMPONENT, THE FLOATING POTENTIAL (OF EACH OF THE TWO SYMMETRICALLY PLACED PROBES WITH RESPECT TO THE SPACECRAFT) IS MEASURED. FROM THESE OBSERVATIONS, THE ELECTRIC FIELD CAN BE CALCULATED FOR KNOWN CONDITIONS OF SATELLITE MOTION, PROBE GEOMETRY, AND MAGNETIC FIELD. TWO PAIRS OF PROBES EXTEND FROM THE SATELLITE EQUATOR, AND ONE PAIR IS ORIENTED ALONG THE SPIN AXIS.

----- SAN MARCO-D/L, SCHMIDTKE-----

INVESTIGATION NAME- AIRGLOW-SOLAR SPECTROMETER

NSSDC ID- SM-DL -02

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
AERONOMY
ATMOSPHERIC PHYSICS

PERSONNEL

PI - G. SCHMIDTKE
OI - F. FISCHER
OI - M. KNOTHE
OI - M. MASCHKE
OI - C. MUNTHERRINST FUR PHYS WELTRAUM
INST FUR PHYS WELTRAUM
INST FUR PHYS WELTRAUM
INST FUR PHYS WELTRAUM
INST FUR PHYS WELTRAUM

BRIEF DESCRIPTION

THE SENSOR MEASURES THE EQUATORIAL DAY AND NIGHT AIRGLOW, THE SOLAR RADIATION REFLECTED FROM THE SURFACE AND CLOUDS, THE SOLAR RADIATION, AND THE RADIATION OF INTERPLANETARY AND INTERGALACTIC ORIGIN REACHING THE SATELLITE IN THE SPECTRAL RANGE FROM 700 TO 20 NM WITH A SPECTRAL RESOLUTION OF 0.7-4 NM. FOUR SPECTROMETERS, 4 GRATINGS, AND 17 MULTIPLIERS ARE USED.

----- SAN MARCO-D/L, SPENCER-----

INVESTIGATION NAME- WIND AND TEMPERATURE (NATE)

NSSDC ID- SM-DL -04

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
METEOROLOGY
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - N.W. SPENCER
OI - G.R. CARIGNANNASA-GSFC
U OF MICHIGAN

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO MEASURE THE IN SITU NEUTRAL WINDS, NEUTRAL PARTICLE TEMPERATURES, AND THE CONCENTRATION OF SELECTED GASES. THREE COMPONENTS OF THE WINDS; ONE NORMAL TO THE SATELLITE DIRECTION, ARE MEASURED. TWO SCANNING BAFFLES ARE USED, ONE MOVING VERTICALLY IN FRONT OF THE SENSOR, AS WAS USED ON SATELLITE ATMOSPHERE EXPLORER-C (AE-C) NEUTRAL ATMOSPHERE TEMPERATURE EXPERIMENT (NATE), AND ONE MOVING HORIZONTALLY NEARLY IDENTICAL IN CONCEPT TO THE VERTICALLY SCANNING BAFFLE AND INCORPORATED ON THE NATE FOR AE-D AND -E. THE MAGNITUDES OF THE HORIZONTAL AND VERTICAL COMPONENTS OF THE WIND NORMAL TO THE SPACECRAFT VELOCITY VECTOR ARE COMPUTED FROM MEASUREMENTS OF THE ANGULAR RELATIONSHIP BETWEEN THE NEUTRAL PARTICLE STREAM AND THE SENSOR. THE COMPONENT OF THE TOTAL STREAM VELOCITY IN THE SATELLITE DIRECTION IS MEASURED DIRECTLY BY THE RETARDING POTENTIAL

QUADRUPOLE (RPQ) THROUGH DETERMINATION OF THE REQUIRED RETARDING POTENTIAL. FROM THESE QUANTITATIVE MEASUREMENTS THE WIND VECTOR IS COMPUTED. THE TEMPERATURE TECHNIQUE USED ON THE AE NATE PROVIDES THE BASIS FOR THE TEMPERATURE MEASUREMENTS FOR THIS MISSION. IT SHOULD BE EMPHASIZED THAT THE WIND AND TEMPERATURE MEASUREMENTS CAN BE PERFORMED IN THE SAME OPERATING MODE. FOR COMPOSITION MEASUREMENTS, THE RPQ MASS SPECTROMETER IS USED IN A SEPARATE OPERATING MODE DESIGNED FOR THIS PURPOSE.

***** SAN MARCO-D/M*****

SPACECRAFT COMMON NAME- SAN MARCO-D/M
ALTERNATE NAMES-

NSSDC ID- SM-DM

LAUNCH DATE- 12/00/81

WEIGHT- 65. KG

LAUNCH SITE- SAN MARCO PLATFORM, OFF COAST OF KENYA
LAUNCH VEHICLE- SCOUTSPONSORING COUNTRY/AGENCY
UNITED STATES
ITALYNASA-OSS
CRA

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 480. MIN
PERIAPSIS- 420. KM ALTINCLINATION- 3. DEG
APDAPSIS- 27400. KM ALT

PERSONNEL

MG - F.W. GAETANO
SC - E.R. SCHMERLING
PM - R.S. TATUM
PS - N.W. SPENCERNASA HEADQUARTERS
NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THIS IS A SMALL SPACECRAFT BUILT AROUND A SINGLE EXPERIMENT. ITS GENERAL APPEARANCE IS THAT OF TWO CYLINDERS WITH A COMMON AXIS, ONE WITH DIAMETER OF 70 CM AND HEIGHT OF 40 CM, WITH THE SECOND CYLINDER EXTENDING FROM THE END OF THE FIRST FOR AN ADDITIONAL 42 CM AND WITH A DIAMETER OF ABOUT 32 CM. THE SURFACE OF THE LARGER CYLINDER IS COVERED WITH 1296 SOLAR CELLS THAT FEED 2 RECHARGEABLE BATTERY PACKS. THE SPACECRAFT IS SPIN STABILIZED ALONG THE AXIS OF ITS CYLINDRICAL STRUCTURE, AND SCANNING OPERATION FOR THE INSTRUMENT IS DEPENDENT UPON THE SATELLITE SPIN. THE PURPOSE OF THIS SPACECRAFT IS TO MONITOR CLOUD COVER AND OZONE CONTENT. WITH ONE-THIRD THE PERIOD OF AN EARTH-SYNCHRONOUS OR STATIONARY SATELLITE, OBSERVATIONS MAY BE REPEATED THREE TIMES PER DAY.

----- SAN MARCO-D/M, BROGLIO-----

INVESTIGATION NAME- IR RADIOMETER FOR MONITORING CLOUD COVER
AND OZONE CONTENT

NSSDC ID- SM-DM -01

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
METEOROLOGY
ATMOSPHERIC PHYSICS

PERSONNEL

PI - L. BROGLIO

NATL RES COUNCIL ITALY

BRIEF DESCRIPTION

THIS RADIOMETER EXPERIMENT IS DESIGNED TO MONITOR CLOUD COVER AND OZONE CONTENT FROM A NEAR-EQUATORIAL ORBIT. A HIGH-RESOLUTION (25-KM INSTANTANEOUS FIELD OF VIEW-IFOV) AND LOW-RESOLUTION (200-KM IFOV) MODE ARE BOTH AVAILABLE. EITHER MODE IS OPERATED THROUGH A COMMON TELESCOPE, FILTER-WHEEL, AND SCAN-MIRROR SYSTEM. THERE ARE THREE HG, CO, TE (MERCURY-CADMIUM-TELLURIDE) DETECTORS. THE HIGH-RESOLUTION (HR) MAPPING OBSERVES IN A 10.5-12.5 MICROMETER BAND. THE LOW-RESOLUTION (LR) MULTISPECTRAL MAPPING OPERATES IN THE SAME BAND (CHANNEL 3) PLUS SIX OTHER BANDS BETWEEN 8.85 AND 15.01 MICROMETERS. BANDWIDTH FOR EACH OF THESE SIX BANDS IS LESS THAN .35 MICROMETERS, AND THE LOW EDGE OF THE BANDWIDTHS ARE AT 8.85, 9.59 (OZONE), 13.81, 14.14 (CO₂), 14.59 (CO₂) AND 14.90 (CO₂) MICROMETERS. IN THE LR MODE, TWO CHANNELS ARE SELECTED FOR SIMULTANEOUS OBSERVING. SCANNING IS ACCOMPLISHED BY SPACECRAFT SPIN PLUS MIRROR STEPPING ONCE EACH REVOLUTION. ONE FRAME REQUIRES 6.5 (IMAGERY) TO 7.5 MIN (SOUNDING) AND CALIBRATION OCCURS ONCE EACH FRAME.

***** SME*****

SPACECRAFT COMMON NAME- SME
ALTERNATE NAMES- SOLAR MESOSPHERE EXPL

NSSDC ID- SME

LAUNCH DATE- 09/01/81

WEIGHT- 145. KG

LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 94.6 MIN
PERIAPSIS- 500. KM ALT

INCLINATION- 97.6 DEG
APOAPSIS- 500. KM ALT

PERSONNEL

MG - F.W. GAETANO
SC - S.G. TILFORD
PM - J.J. PAULSON
PS - C.A. BARTH

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-JPL
U OF COLORADO

BRIEF DESCRIPTION

THE SOLAR MESOSPHERE EXPLORER (SME) MISSION OBJECTIVE IS TO UNDERSTAND WHAT PHYSICAL PHENOMENA CAUSE CHANGES IN THE DENSITY AND DISTRIBUTION OF THE EARTH'S OZONE. THIS OBJECTIVE IS ACCOMPLISHED BY MEASURING OZONE PARAMETERS AND THE PROCESSES IN THE MESOSPHERE AND UPPER STRATOSPHERE THAT DETERMINE THEIR VALUES. SIMULTANEOUS MEASUREMENTS ARE MADE OF OZONE, THE SOLAR ULTRAVIOLET RADIATION THAT PRODUCES AND DESTROYS IT, AND THE AMOUNT OF WATER VAPOR AND NITROGEN DIOXIDE WHOSE PHOTODISSOCIATION PRODUCTS CAUSE CATALYTIC DESTRUCTION OF OZONE. TEMPERATURE AND PRESSURE ARE ALSO MEASURED. THE SATELLITE EXPERIMENT COMPLEMENT CONSISTS OF A SOLAR ULTRAVIOLET SPECTROMETER, AN OZONE UV SPECTROMETER, AN INFRARED RADIOMETER, AN INFRARED SPECTROMETER, AND A NITROGEN DIOXIDE SPECTROMETER. IN ADDITION, A SOLAR PROTON ALARM MECHANISM IS CARRIED TO MEASURE THE INTEGRATED SOLAR FLUX IN THE RANGE 30-500 MEV. SPIN STABILIZED AT ABOUT 5 RPM, THE SATELLITE MOVES IN A 3 A.M. - 3 P.M. SUN-SYNCHRONOUS ORBIT. THE SPACECRAFT SHAPE IS THAT OF A RIGHT OCTAGONAL PRISM SLIGHTLY UNDER 1 M IN DIAMETER AND .75 M IN LENGTH. THE BASE MODULE HOUSES ALL SPACECRAFT SUBSYSTEMS EXCEPT THE SCIENTIFIC PAYLOAD AND DATA STORAGE. THE OBSERVATORY MODULE CONTAINING THE FIVE SCIENTIFIC INSTRUMENTS, ASSOCIATED ENGINEERING SENSORS, AND THE DATA STORAGE SYSTEM IS ATTACHED AS AN ASSEMBLY TO ONE OF THE OCTAGON FACES OF THE BASE MODULE. THE LAUNCH VEHICLE ADAPTOR IS MOUNTED TO THE OPPOSITE OCTAGONAL FACE. THE SPIN AXIS IS ORIENTED NORMAL TO THE ORBITAL PLANE IN THE DATA-TAKING MODE. A MAGNETIC CONTROL SYSTEM MAINTAINS THE ATTITUDE OF THE SPIN AXIS TO WITHIN PLUS OR MINUS 1 DEG PITCH AND PLUS OR MINUS 2 DEG YAW, AND IS NOT USED DURING DATA-TAKING PERIODS. THERE IS A SEPARATE SPIN RATE CONTROL. THE COMMAND SYSTEM IS CAPABLE OF EXECUTING EITHER DISCRETE OR MODAL COMMANDS IN REAL TIME OR FROM STORED PROGRAM CONTROL. POWER IS SUPPLIED BY A SOLAR CELL ARRAY. THE TELEMETRY SYSTEM IS PCM AND CAN BE USED EITHER IN A REAL TIME OR IN A TAPE RECORDER MODE.

----- SME, BARTH-----

INVESTIGATION NAME- UV OZONE

NSSDC ID- SME -01

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - C.A. BARTH
OI - G.J. ROTTMAN
OI - R.J. THOMAS
OI - J.C. GILLE
OI - A.I. STEWART
OI - C.W. HORD
OI - P.J. CRUTZEN
OI - R.E. DICKINSON
OI - P.L. BAILEY
OI - J.F. NOXON
OI - G.E. THOMAS
OI - J. LONDON

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BRIEF DESCRIPTION

THE OBJECTIVE OF THE ULTRAVIOLET OZONE EXPERIMENT IS TO MEASURE OZONE ABSORPTION OF RAYLEIGH-SCATTERED SUNLIGHT IN THE MIDDLE ULTRAVIOLET REGION. A DUAL CHANNEL EBERT-FASTIE SPECTROMETER OPERATING IN THE REGIONS 2460-3100 A AND 2710-3350 A VIEWS NORMAL TO THE SPIN AXIS. THE FIELD OF VIEW SWEEPS THROUGH THE LIMB SAMPLING A SUCCESSION OF 20 ELEMENTS OF THE ATMOSPHERE, EACH APPROXIMATELY 3.5 KM IN HEIGHT AT THE EARTH'S LIMB.

----- SME, BARTH-----

INVESTIGATION NAME- INFRARED RADIOMETER

NSSDC ID- SME -02

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - C.A. BARTH
OI - G.J. ROTTMAN
OI - R.J. THOMAS
OI - J.C. GILLE
OI - P.L. BAILEY
OI - J.F. NOXON
OI - A.I. STEWART

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OI - C.W. HORD
OI - G.E. THOMAS
OI - J. LONDON
OI - P.J. CRUTZEN
OI - R.E. DICKINSON

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BRIEF DESCRIPTION

THE OBJECTIVE OF THE INFRARED RADIOMETER EXPERIMENT IS TO DETERMINE THE ALTITUDE-MIXING RATIO PROFILES FOR WATER AND OZONE FROM THERMAL EMISSIONS. PRESSURE AND TEMPERATURE ARE ALSO DETERMINED. A FOUR-CHANNEL RADIOMETER/TELESCOPE WITH TWO FILTER-DETECTOR COMBINATIONS OPERATING IN THE MICROMETER REGIONS 6.1-7.2, 8.6-10.6, 14.7-15.7, AND 13.2-17.2 VIEWS NORMAL TO THE SPIN AXIS. THE FIELD OF VIEW SWEEPS THROUGH THE LIMB SAMPLING A SUCCESSION OF 20 ELEMENTS OF THE ATMOSPHERE, EACH APPROXIMATELY 3.5 KM IN HEIGHT AT THE EARTH'S LIMB.

----- SME, BARTH-----

INVESTIGATION NAME- 1.27 MICROMETER AIRGLOW

NSSDC ID- SME -03

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - C.A. BARTH
OI - G.J. ROTTMAN
OI - R.J. THOMAS
OI - J.C. GILLE
OI - P.L. BAILEY
OI - J.F. NOXON
OI - A.I. STEWART
OI - C.W. HORD
OI - G.E. THOMAS
OI - J. LONDON
OI - P.J. CRUTZEN
OI - R.E. DICKINSON

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BRIEF DESCRIPTION

THE OBJECTIVE OF THE 1.27-MICROMETER AIRGLOW EXPERIMENT IS TO OBTAIN LIMB-SCANNING MEASUREMENTS OF THE 1.27-MICROMETER AIRGLOW IN THE 50- TO 80-KM ALTITUDE RANGE, AND OF THE HYDROXYL EMISSION BETWEEN 0.8 AND 2.4 MICROMETERS. A DUAL-CHANNEL EBERT-FASTIE SPECTROMETER OPERATING IN THE REGIONS 0.7-1.4 AND 1.2-2.4 MICROMETERS VIEWS NORMAL TO THE SPIN AXIS. THE FIELD OF VIEW SWEEPS THROUGH THE LIMB SAMPLING A SUCCESSION OF 20 ELEMENTS OF THE ATMOSPHERE, EACH APPROXIMATELY 3.5 KM IN HEIGHT AT THE EARTH'S LIMB.

----- SME, BARTH-----

INVESTIGATION NAME- VISIBLE NITROGEN DIOXIDE

NSSDC ID- SME -04

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - C.A. BARTH
OI - G.J. ROTTMAN
OI - R.J. THOMAS
OI - J.C. GILLE
OI - P.L. BAILEY
OI - J.F. NOXON
OI - A.I. STEWART
OI - C.W. HORD
OI - G.E. THOMAS
OI - J. LONDON
OI - P.J. CRUTZEN
OI - R.E. DICKINSON

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BRIEF DESCRIPTION

THE OBJECTIVE OF THE VISIBLE NITROGEN DIOXIDE EXPERIMENT IS TO MEASURE THE DISTRIBUTION OF NITROGEN DIOXIDE IN THE 20- TO 40-KM ALTITUDE REGION. A DUAL-CHANNEL EBERT-FASTIE SPECTROMETER OPERATING IN WAVELENGTH REGIONS OF 3250-4500 A AND 5200-7700 A VIEWS NORMAL TO THE SPIN AXIS. THE FIELD OF VIEW SWEEPS THROUGH THE LIMB SAMPLING A SUCCESSION OF 20 ELEMENTS OF THE ATMOSPHERE, EACH APPROXIMATELY 3.5 KM IN HEIGHT AT THE EARTH'S LIMB.

----- SME, BARTH-----

INVESTIGATION NAME- SOLAR UV MONITOR

NSSDC ID- SME -05

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
ATMOSPHERIC PHYSICS

PERSONNEL

PI - C.A. BARTH	U OF COLORADO
OI - G.J. ROTHMAN	U OF COLORADO
OI - R.J. THOMAS	U OF COLORADO
OI - J.C. GILLE	NATL CTR FOR ATMOS RES
OI - P.L. BAILEY	NATL CTR FOR ATMOS RES
OI - J.F. NOXON	NOAA
OI - A.I. STEWART	U OF COLORADO
OI - C.W. HORD	U OF COLORADO
OI - G.E. THOMAS	U OF COLORADO
OI - J. LONDON	U OF COLORADO
OI - P.J. CRUTZEN	NATL CTR FOR ATMOS RES
OI - R.E. DICKINSON	NATL CTR FOR ATMOS RES

BRIEF DESCRIPTION

THE OBJECTIVE OF THE SOLAR ULTRAVIOLET MONITOR EXPERIMENT IS TO MONITOR THE INCOMING SOLAR RADIATION TO DETERMINE THE EFFECT ON THE OZONE CONCENTRATIONS. A DUAL-CHANNEL EBERT-FASTIE SPECTROMETER OPERATING IN THE REGIONS 2200-3100 Å AND 1600-2500 Å HAS A LOOK DIRECTION 45 DEG TO THE SPACECRAFT AXIS OF ROTATION. IN A 3 AM - 3 PM ORBIT THE SOLAR MONITOR SCANS THROUGH THE SUN ONCE PER SPACECRAFT REVOLUTION. THE ACCEPTANCE ANGLE OF THE INSTRUMENT IS PLUS OR MINUS 10 DEG.

----- SME, BARTH-----

INVESTIGATION NAME- SOLAR PROTON ALARM

NSSDC ID- SME -06

INVESTIGATIVE PROGRAM
CODE STINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - C.A. BARTH	U OF COLORADO
OI - G.J. ROTHMAN	U OF COLORADO
OI - R.J. THOMAS	U OF COLORADO
OI - J.C. GILLE	NATL CTR FOR ATMOS RES
OI - P.L. BAILEY	NATL CTR FOR ATMOS RES
OI - J.F. NOXON	NOAA
OI - A.I. STEWART	U OF COLORADO
OI - C.W. HORD	U OF COLORADO
OI - G.E. THOMAS	U OF COLORADO
OI - J. LONDON	U OF COLORADO
OI - P.J. CRUTZEN	NATL CTR FOR ATMOS RES
OI - R.E. DICKINSON	NATL CTR FOR ATMOS RES

BRIEF DESCRIPTION

THE SOLAR PROTON ALARM EXPERIMENT DETECTS PROTONS BETWEEN 30 AND 500 MEV. WHEN THE FLUX EXCEEDS A SELECTED VALUE THE INSTRUMENT SIGNALS AN OPPORTUNITY TO ALTER SCIENCE COMMANDS TO OBSERVE THE EFFECTS OF SOLAR PROTONS ON ATMOSPHERIC CONSTITUENTS.

***** SMM*****

SPACECRAFT COMMON NAME- SMM

ALTERNATE NAMES- SOLAR MAXIMUM MISSION

NSSDC ID- SMM

LAUNCH DATE- 02/10/80

WEIGHT- 2273. KG

LAUNCH SITE- CAPE CANAVERAL, UNITED STATES

LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY

UNITED STATES

NASA-OSS

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC

ORBIT PERIOD- 96.2 MIN

INCLINATION- 28.6 DEG

PERIAPSIS- 575. KM ALT

APOAPSIS- 575. KM ALT

PERSONNEL

MG - M.E. McDONALD	NASA HEADQUARTERS
SC - J.D. BOHLIN	NASA-GSFC
PM - P.T. BURR	NASA-GSFC
PS - K.J. FROST	NASA-GSFC

BRIEF DESCRIPTION

THE SOLAR MAXIMUM MISSION (SMM) IS DEDICATED TO COORDINATED OBSERVATIONS OF SPECIFIC SOLAR ACTIVITY AND SOLAR FLARE PROBLEMS. THE SPACECRAFT IS ORIENTED TOWARD THE SUN DURING THE DAYLIGHT PORTION OF THE ORBIT. THE SPACECRAFT ITSELF DOES NOT RASTER OVER THE SOLAR DISK, ALTHOUGH INDIVIDUAL INSTRUMENTS HAVE THIS CAPABILITY. THE SMM SPACECRAFT IS DESIGNED SO THAT IT CAN BE RETRIEVED BY AN EARLY SHUTTLE FLIGHT, RETURNED TO EARTH, REFURBISHED AND FITTED WITH AN UPDATE PAYLOAD, AND RETURNED TO ORBIT FOR ANOTHER SOLAR-ORIENTED MISSION.

----- SMM, ACTON-----

INVESTIGATION NAME- SOFT X-RAY POLYCHROMATOR

NSSDC ID- SMM -04

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - L.W. ACTON	LOCKHEED PALO ALTO
PI - A.H. GABRIEL	APPLETON LAB
PI - J.L. CULHANE	U COLLEGE LONDON
OI - R.C. CATURA	LOCKHEED PALO ALTO
OI - J.H. PARKINSON	U COLLEGE LONDON
OI - C.G. RAPLEY	U COLLEGE LONDON
OI - B.B. JONES	APPLETON LAB
OI - C. JORDAN	OXFORD U
OI - C.J. WOLFSON	LOCKHEED PALO ALTO
OI - B.C. FAWCETT	APPLETON LAB

BRIEF DESCRIPTION

THIS EXPERIMENT USES X-RAY EMISSION LINES IN THE 0.4-NM TO 2.24-NM SPECTRAL REGION AS DIAGNOSTIC TOOLS TO INVESTIGATE ASPECTS OF SOLAR ACTIVITY LEADING TO PLASMA TEMPERATURES IN THE 1.5 TO 50 MILLION K RANGE. THE INSTRUMENTATION INCLUDES TWO SYSTEMS, A FLAT-CRYSTAL SPECTROMETER AND A BENT-CRYSTAL SPECTROMETER. THE FLAT-CRYSTAL SPECTROMETER COVERS FROM 1.4 TO 22.44 Å IN 7 RANGES, HAS A FIELD OF VIEW OF 10 BY 10 ARC S, AND CAN RASTER OVER A 7 BY 7 ARC MIN AREA. ITS BEST TIME RESOLUTION IS 0.25 S. THE BENT-CRYSTAL SPECTROMETER CONSISTS OF A SET OF BENT CRYSTALS COVERING SEVEN IRON LINES (BETWEEN 1.769 AND 1.945 Å) AND THE CALCIUM XIX LINE BETWEEN 3.165 AND 3.231 Å. THIS INSTRUMENT HAS A FIELD OF VIEW OF 6 BY 6 ARC MIN, IS NOT RASTERED AND HAS A MAXIMUM TIME RESOLUTION OF 0.1 S.

----- SMM, CHUPP-----

INVESTIGATION NAME- GAMMA RAY EXPERIMENT

NSSDC ID- SMM -07

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - E.L. CHUPP	U OF NEW HAMPSHIRE
OI - D.J. FORREST	U OF NEW HAMPSHIRE
OI - K. PINKAU	MPI-EXTRATERR PHYS
OI - C. REPPIN	MPI-EXTRATERR PHYS
OI - E. RIEGER	MPI-EXTRATERR PHYS
OI - W.N. JOHNSON	US NAVAL RESEARCH LAB
OI - R.L. KINZER	US NAVAL RESEARCH LAB
OI - J.D. KURFESS	US NAVAL RESEARCH LAB
OI - G.H. SHARE	US NAVAL RESEARCH LAB
OI - A.S. JACOBSON	NASA-JPL

BRIEF DESCRIPTION

THE PRIMARY SCIENTIFIC GOAL OF THIS EXPERIMENT IS THE STUDY OF GAMMA-RAY EMISSIONS FROM THE SUN BEFORE AND DURING SOLAR FLARES. THE MAIN DETECTOR IS A SET OF SEVEN 7.6 BY 7.6 CM SODIUM IODIDE SCINTILLATORS COVERING THE ENERGY RANGE FROM 0.3 TO 17 MEV WITH AN ENERGY RESOLUTION OF BETTER THAN 7 PERCENT AT 0.662 MEV, AND TEMPORAL RESOLUTIONS RANGING FROM 16 S (FULL ENERGY RANGE) TO 1 S (SELECTED ENERGY INTERVAL) TO 0.064 S. A HIGH-ENERGY DETECTOR CONSISTS OF THE SODIUM IODIDE ARRAY AND A CESIUM IODIDE SCINTILLATOR COVERING FROM 10 TO 160 MEV WITH A TEMPORAL RESOLUTION OF 2 S FOR HIGH-ENERGY NEUTRONS AND GAMMA RAYS. TWO ADDITIONAL SODIUM IODIDE SCINTILLATORS FORM AN X-RAY DETECTOR SENSITIVE BETWEEN 10 AND 160 KEV WITH FOUR CHANNELS OF ENERGY RESOLUTION AND A TEMPORAL RESOLUTION OF 1 S.

----- SMM, DE JAGER-----

INVESTIGATION NAME- HARD X-RAY IMAGING SPECTROMETER

NSSDC ID- SMM -05

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - C. DE JAGER	U OF UTRECHT
OI - H.F. VAN BEEK	SPACE RESEARCH LAB
OI - A.P. WILLMORE	U OF BIRMINGHAM

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO MEASURE THE POSITION, STRUCTURE, AND THERMODYNAMIC PROPERTIES OF HOT THERMAL AND NONTHERMAL SOURCES IN ACTIVE REGIONS AND FLARES. THIS INSTRUMENT PRODUCES TWO-DIMENSIONAL IMAGES WITH 8 ARC S RESOLUTION OVER A CIRCULAR AREA 2 MIN 40 S IN DIAMETER, OR 32 ARC S RESOLUTION OVER A 6 MIN 24 S BY 6 MIN 24 S AREA, OR TWO ONE-DIMENSIONAL IMAGES CONSISTING OF TWELVE 4-ARC MIN BY 16-ARC S FAN BEAMS IN X, AND 12 FAN BEAMS OF 16 ARC S BY 4 ARC MIN IN Y. THESE IMAGES ARE OBSERVED IN SIX ENERGY CHANNELS BETWEEN 3.5 AND 30 KEV, AND WITH A TEMPORAL RESOLUTION OF AT LEAST 1.5 S. A HIGH-ENERGY MONITOR OBSERVES THE ENTIRE SUN AT ENERGIES UP TO 40 KEV.

----- SMM, FROST-----

INVESTIGATION NAME- X-RAY SPECTROMETER

NSSDC ID- SMM -06 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - K.J. FROST	NASA-GSFC
O1 - L.E. ORWIG	NASA-GSFC
O1 - B.R. DENNIS	NASA-GSFC
O1 - T.L. CLINE	NASA-GSFC
O1 - U.D. DESAI	NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURES FLARE X-RAY EMISSION WITH 16 CHANNEL ENERGY ANALYSIS AND 0.1 S TIME RESOLUTION IN THE ENERGY RANGE OF 20 TO 300 KEV. A SEARCH FOR TEMPORAL STRUCTURE IN THE X-RAY EMISSION WITH A TIME RESOLUTION OF 1 MS IS CONDUCTED USING ONE CHANNEL BETWEEN 20 AND 300 KEV.

----- SMM, MACQUEEN-----

INVESTIGATION NAME- CORONAGRAPH/POLARIMETER

NSSDC ID- SMM -01 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - R.M. MACQUEEN	HIGH ALTITUDE OBS
O1 - L.L. HOUSE	HIGH ALTITUDE OBS
O1 - W.J. WAGNER	HIGH ALTITUDE OBS
O1 - E.G. HILDNER	HIGH ALTITUDE OBS
O1 - G.A. DULK	U OF COLORADO
O1 - R.J. HANSEN	HIGH ALTITUDE OBS
O1 - R. KOPP	LOS ALAMOS SCI LAB
O1 - G.W. PNEUMAN	HIGH ALTITUDE OBS
O1 - C.W. QUERFELD	HIGH ALTITUDE OBS
O1 - H.U. SCHMIDT	MPI-PHYS ASTROPHYS
O1 - K.V. SHERIDAN	CSIRO-DIV OF RADIOPHYS

BRIEF DESCRIPTION

THE PRIME OBJECTIVE OF THIS EXPERIMENT IS TO MEASURE THE RESPONSE OF THE ELECTRON DENSITY AND MAGNETIC FIELD STRUCTURE OF THE CORONA TO THE PASSAGE OF TRANSIENT PHENOMENA ON RAPID TIME SCALES. THE SECONDARY OBJECTIVE IS TO DETERMINE THE DENSITY AND ORIENTATION OF THE MAGNETIC FIELD STRUCTURE OF THE CORONA ON A SYNOPTIC BASIS. THE CORONAGRAPH/POLARIMETER IS EXTERNALLY OCCULTED BY THREE DISKS, WITH A 2.6-CM DIAMETER PRIMARY OBJECTIVE LENS, OF AIR-Spaced DOUBLET DESIGN. CORONAL QUADRANTS ARE IMAGED AT F/34 ON A MESHLESS VIDICON WITH A ROTATING MIRROR ARRANGEMENT AND ARE RECORDED ON A DEDICATED TAPE RECORDER FOR SUBSEQUENT TRANSMISSION TO THE EARTH. FIELDS OF VIEW RANGE FROM 1.5 TO 6 SQ SOLAR RADII AND ARE SELECTABLE WITHIN THE CORONAL QUADRANT. SPATIAL RESOLUTION IS SELECTABLE BETWEEN 6.4 AND 12.8 ARC S. SEVEN FILTERS ARE AVAILABLE WITHIN THE RANGE OF 4400 A TO 6583 A, AND POLARIZATION IS MEASURED BY A SEQUENCE OF THREE POLAROIDs ORIENTED 60 DEG APART (A CLEAR POSITION IS ALSO AVAILABLE). THE STRAY RADIANCE IS ABOUT $3.E-10$ OF THE SOLAR BRIGHTNESS IN THE OUTER FIELD. THE INSTRUMENT IS ON AN INDEPENDENT GIMBAL MOUNT AND IS SUN-CENTERED TO WITHIN 10 ARC S.

----- SMM, TANDBERG-HANSEN-----

INVESTIGATION NAME- ULTRAVIOLET SPECTROMETER AND POLARIMETER

NSSDC ID- SMM -02 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
ATMOSPHERIC PHYSICS
AERONOMY

PERSONNEL

PI - E. TANDBERG-HANSEN	NASA-MSFC
O1 - R.G. ATHAY	HIGH ALTITUDE OBS
O1 - J.M. BECKERS	SACRAMENTO PEAK OBS
O1 - J.C. BRANDT	NASA-GSFC
O1 - E.C. BRUNER, JR.	LOCKHEED PALO ALTO
O1 - R.D. CHAPMAN	NASA-GSFC
O1 - B.E. WOODGATE	NASA-GSFC

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS EXPERIMENT ARE TO STUDY SOLAR ULTRAVIOLET RADIATIONS FROM ACTIVE REGIONS, FLARES, AND THE CORONA IN ORDER TO DETERMINE THE PHYSICAL PARAMETERS OF TEMPERATURE, DENSITY, VELOCITY, AND MAGNETIC FIELD IN THE SUN'S ATMOSPHERE, AND TO CONDUCT AN AERONOMY PROGRAM TO MEASURE VARIOUS CONSTITUENTS IN THE EARTH'S ATMOSPHERE BY MEASURING THE ATMOSPHERIC EXTINCTION OF SUNLIGHT AT SPACECRAFT DUSK AND DAWN. THIS INSTRUMENT IS A MODIFIED VERSION OF THE TELESCOPE-SPECTROGRAPH SYSTEM FLOWN ON THE EIGHTH ORBITING SOLAR OBSERVATORY (OSO-8). THE INSTRUMENT COVERS THE 1100- TO 3000 A REGION WITH A SPECTRAL RESOLUTION OF ABOUT 0.010 A FWHM, AND OBSERVES AN AREA OF TO 4 BY 4 ARC MIN IN SIZE AT A POINT DETERMINED BY THE SPACECRAFT POINTING SYSTEM, WITH A SPATIAL

RESOLUTION COMMANDABLE BETWEEN 1 BY 1 ARC S AND 30 BY 30 ARC S. POLARIZATION IS MEASURED USING A ROTATING QUARTER-WAVE PLATE INSERTED IN THE LIGHT PATH SO ALL FOUR STOKES PARAMETERS CAN BE DETERMINED. IT IS POSSIBLE TO SELECT ANY OF SIX PAIRS OF LINES FOR POLARIMETRY AND ANY OF THREE SETS OF FOUR LINES FOR SPECTROSCOPY TO ALLOW SIMULTANEOUS ANALYSIS AT DIFFERENT HEIGHTS IN THE SOLAR ATMOSPHERE.

----- SMM, WILLSON-----

INVESTIGATION NAME- ACTIVE CAVITY RADIOMETER IRRADIANCE
MONITOR

NSSDC ID- SMM -08 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - R.C. WILLSON	NASA-JPL
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BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS THE MEASUREMENT OF THE TOTAL SOLAR IRRADIANCE WITH STATE-OF-THE-ART ACCURACY AND PRECISION. THE TOTAL SOLAR IRRADIANCE FROM THE FAR-ULTRAVIOLET THROUGH THE FAR-INFRARED WAVELENGTHS IS MEASURED BY THREE ACTIVE-CAVITY RADIOMETER (TYPE IV) DETECTORS. THESE DETECTORS ARE ELECTRICALLY SELF-CALIBRATED, CAVITY PYRHELIOMETERS AND ARE EACH CAPABLE OF DEFINING THE ABSOLUTE RADIATION SCALE WITH AN UNCERTAINTY OF 0.1 PERCENT IN THE INTERNATIONAL SYSTEM OF UNITS.

***** SPACE SHUTTLE LDEF-A*****

SPACECRAFT COMMON NAME- SPACE SHUTTLE LDEF-A
ALTERNATE NAMES- LONG DURATION EXPOS.FAC., LDEF

NSSDC ID- SSLDEF

LAUNCH DATE- 02/01/80	WEIGHT- 9200. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES	
LAUNCH VEHICLE- SHUTTLE	

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OAST

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC	
ORBIT PERIOD- 93.3 MIN	INCLINATION- 28.5 DEG
PERIAPSIS- 360. KM ALT	APOAPSIS- 360. KM ALT

PERSONNEL

MG - H.C. HILL	NASA HEADQUARTERS
PM - W.H. KINARD	NASA-LARC

BRIEF DESCRIPTION

THE LDEF IS BEING DEVELOPED BY THE NASA OFFICE OF AERONAUTICS AND SPACE TECHNOLOGY AND THE NASA/LANGLEY RESEARCH CENTER TO ACCOMMODATE, USING SHUTTLE, A CLASS OF TECHNOLOGY, SCIENCE, AND APPLICATIONS EXPERIMENTS WHICH REQUIRE A FREE-FLYING EXPOSURE IN SPACE AND WHICH BENEFIT FROM POST-FLIGHT LABORATORY INVESTIGATIONS WITH THE RETRIEVED EXPERIMENT HARDWARE. IT IS PLANNED TO REGULARLY LAUNCH AND RECOVER LDEF AT APPROXIMATELY YEARLY INTERVALS. THE APPROVED EXPERIMENTS ARE NOW BEING DEVELOPED.

----- SPACE SHUTTLE LDEF-A, AHLBORN-----

INVESTIGATION NAME- ORBITAL LUBRICATION EXPERIMENT

NSSDC ID- SSLDEF -25 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - G. AHLBORN	BALL AEROSPACE SYS DIV
O1 - V. FRIEBEL	BALL AEROSPACE SYS DIV

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO EVALUATE THE CUMULATIVE EFFECTS OF SPACE ON LUBRICANT OILS. SMALL CHANGES CAUSED BY SPACE EXPOSURE ARE IMPORTANT TO SUCH PHYSICAL BEHAVIOR AS FRICTION AND SURFACE WETTING. RADIATION EFFECTS ARE VIRTUALLY UNKNOWN. LUBRICANTS CONSIDERED FOR TESTING INCLUDE SATURATED HYDROCARBONS, DI-ESTERS, SILICONES, PENETAERYTHRITAL ESTERS, AND PERFLUOROALKYLPOLYETHERS.

----- SPACE SHUTTLE LDEF-A, BANKS-----

INVESTIGATION NAME- ION BEAM TEXTURED AND COATED SURFACES

NSSDC ID- SSLDEF -01 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

ORIGINAL PAGE IS
OF POOR QUALITY

PERSONNEL
PI - B.A. BANKS
OI - M.J. MIRTICH
OI - A.J. WEIGAND

NASA-LERC
NASA-LERC
NASA-LERC

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURES THE EFFECT OF THE SPACE SHUTTLE LAUNCH AND NEAR-EARTH SPACE ENVIRONMENT EXPOSURE ON THE OPTICAL PROPERTIES OF ION BEAM TEXTURED HIGH-ABSORBENCE SOLAR THERMAL CONTROL SURFACES AND THE OPTICAL AND ELECTRICAL PROPERTIES OF ION BEAM CONDUCTIVE SOLAR THERMAL CONTROL SURFACES. VERIFICATION OF THE DURABILITY OF THESE SURFACES IS CONDUCTIVE TO THE ACCEPTANCE OF THIS TECHNOLOGY ON FUTURE SPACE SYSTEMS.

----- SPACE SHUTTLE LDEF-A, BLUE-----

INVESTIGATION NAME- EFFECTS OF LONG-DURATION EXPOSURE ON ACTIVE OPTICAL SYSTEMS COMPONENTS

NSSDC ID- SSLDEF -26

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - D.M. BLUE
OI - J.J. GALLAGHER
OI - R.G. SHACKELFORD

GEORGIA INST OF TECH
GEORGIA INST OF TECH
GEORGIA INST OF TECH

BRIEF DESCRIPTION

THE EFFECTS OF SPACE EXPOSURE ON THE PERFORMANCE OF LASERS, RADIATION DETECTORS, AND OTHER OPTICAL COMPONENTS ARE MEASURED. FROM THE RESULTS OBTAINED, GUIDES FOR COMPONENT SELECTION ARE ESTABLISHED.

----- SPACE SHUTTLE LDEF-A, BOURRIEAU-----

INVESTIGATION NAME- OPTICAL FIBERS AND COMPONENTS

NSSDC ID- SSLDEF -43

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - J. BOURRIEAU

CERT/ONERA

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO EXAMINE THE RADIATION EFFECTS ON FIBER OPTIC WAVEGUIDES WHICH ARE USED AS IMPORTANT COMPONENTS IN NEW COMMUNICATION SYSTEMS, OPTOELECTRONIC CIRCUITS AND DATA LINKS. COMPARISONS OF RADIATION-INDUCED DAMAGES IN FLIGHT AND DURING LABORATORY TESTS ARE TO DETERMINE THE VALIDITY OF IRRADIATION TESTS WITH RADIOACTIVE SOURCES.

----- SPACE SHUTTLE LDEF-A, BRANDHORST, JR.-----

INVESTIGATION NAME- ADVANCED PHOTOVOLTAIC EXPERIMENT

NSSDC ID- SSLDEF -02

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - H.W. BRANDHORST, JR.
OI - A.F. FORESTIERI

NASA-LERC
NASA-LERC

BRIEF DESCRIPTION

THIS EXPERIMENT IS FLOWN TO INVESTIGATE THE EFFECT OF SPACE EXPOSURE ON NEW SOLAR CELL AND ARRAY MATERIALS, TO EVALUATE THEIR PERFORMANCE, AND TO MEASURE LONG-TIME VARIATIONS IN THE SPECTRAL CONTENT OF SUNLIGHT. SOLAR CELLS ARE CALIBRATED FOR SPACE USE.

----- SPACE SHUTTLE LDEF-A, BUCKER-----

INVESTIGATION NAME- FREE FLYER BIOSTACK

NSSDC ID- SSLDEF -50

INVESTIGATIVE PROGRAM
CODE SB/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL

PI - H. BUCKER

DFVLR

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO INVESTIGATE THE BIOLOGICAL EFFECTIVENESS OF THE STRUCTURED COMPONENTS IN BLOCKING COSMIC RADIATION DURING SPACE FLIGHT, WITH EMPHASIS ON THE EFFECTS OF INDIVIDUAL VERY HEAVY IONS. QUANTITATIVE ASSESSMENT OF THE HAZARDS OF HEAVY ION PARTICLES TO MAN IN SPACE PERMITS THE ESTABLISHMENT OF SUITABLE PROTECTION GUIDELINES FOR MAN AND BIOLOGICAL EXPERIMENTS IN THE FUTURE SPACE FLIGHTS.

----- SPACE SHUTTLE LDEF-A, CALHOUN-----

INVESTIGATION NAME- CASCADE VARIABLE CONDUCTANCE HEAT PIPE

NSSDC ID- SSLDEF -39

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - L.D. CALHOUN

MCDONNELL-DOUGLAS CORP

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO VERIFY THE CAPABILITY OF A VARIABLE-CONDUCTANCE HEAT PIPE SYSTEM TO PROVIDE PRECISE TEMPERATURE CONTROL OF LONG-LIFE SPACECRAFT, WITHOUT NEED OF FEEDBACK HEATER OR OTHER POWER SOURCES FOR TEMPERATURE ADJUSTMENT, UNDER CONDITIONS OF WIDELY VARYING POWER INPUT AND THE SPACE ENVIRONMENT.

----- SPACE SHUTTLE LDEF-A, CALLEN-----

INVESTIGATION NAME- SPACE TESTING OF HOLOGRAPHIC DATA STORAGE CRYSTALS

NSSDC ID- SSLDEF -08

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - W.R. CALLEN
OI - T.K. GAYLORD

GEORGIA INST OF TECH
GEORGIA INST OF TECH

BRIEF DESCRIPTION

THE EFFECT OF LONG SPACE EXPOSURE ON ELECTRO-OPTIC CRYSTALS FOR USE IN ULTRA-HIGH CAPACITY SPACE DATA STORAGE AND RETRIEVAL SYSTEMS IS TESTED. THE INFORMATION OBTAINED HELPS DEVELOP HIGH BIT CAPACITY RECORDER AND MEMORY SYSTEMS.

----- SPACE SHUTTLE LDEF-A, CRIFO-----

INVESTIGATION NAME- THIN METAL FILM AND EVAPORATED CATHODES PERFORMANCE IN SPACE

NSSDC ID- SSLDEF -40

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - J.F. CRIFO
OI - J.M. BERSET

CNRS-LPSP
CNRS-LPSP

BRIEF DESCRIPTION

THIS EXPERIMENT IS DESIGNED TO TEST THE SPACE BEHAVIOR OF VACUUM UV OPTICAL COMPONENTS (EUV THIN FILMS, UV GAS FILTERS, PHOTOCATHODES AND UV CRYSTAL FILTERS) AND TO PROVIDE DATA FOR THE DEVELOPMENT AND QUALIFICATION OF NEW COMPONENTS.

----- SPACE SHUTTLE LDEF-A, DELASI-----

INVESTIGATION NAME- EFFECTS OF THE SPACE ENVIRONMENT ON THE PROPERTIES OF METALLIZED DIELECTRICS

NSSDC ID- SSLDEF -20

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - R.J. DELASI
OI - F. KUEHNE
OI - M. ROSSI

GRUMMAN AEROSPACE CORP
GRUMMAN AEROSPACE CORP
GRUMMAN AEROSPACE CORP

BRIEF DESCRIPTION

THIS EXPERIMENT TESTS THE PERFORMANCE IN THE SPACE ENVIRONMENT OF METALLIZED DIELECTRIC STRUCTURES WHICH ARE BEING CONSIDERED FOR DIPOLE ARRAY, TO OBTAIN QUANTITATIVE DATA ON THE DEGRADATION OF MECHANICAL, OPTICAL AND DIELECTRIC PROPERTIES, AND TO EVALUATE THE UTILITY OF COATINGS TO PREVENT OR RETARD DEGRADATION OF THESE STRUCTURES.

----- SPACE SHUTTLE LDEF-A, FELBECK-----

INVESTIGATION NAME- INFLUENCE OF SPACE EXPOSURE ON MECH PROPERTIES OF HI-TOUGHNESS GRAPHITE-EPPOXY

NSSDC ID- SSLDEF -06

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - D.K. FELBECK

U OF MICHIGAN

BRIEF DESCRIPTION

THIS EXPERIMENT IS FLOWN TO TEST THE EFFECT OF EXTENDED EXPOSURE TO A SPACE ENVIRONMENT ON THE MECHANICAL PROPERTIES OF A SPECIALLY TOUGHENED 5208/T300 GRAPHITE-EPOXY COMPOSITE MATERIAL. SPECIMENS MADE BY RECENTLY DEVELOPED TECHNIQUES OF INTERMITTENT INTERLAMINAR BONDING ARE EXPOSED AND AFTERWARD TESTED FOR (1) FRACTURE TOUGHNESS, (2) TENSILE STRENGTH, AND (3) ELASTIC MODULUS.

----- SPACE SHUTTLE LDEF-A, FILZ-----

INVESTIGATION NAME- PASSIVE COSMIC RADIATION DETECTOR

NSSDC ID- SSLDEF -14

INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - R.C. FILZ
OI - R. BEAUJEAN
OI - P.J. MCNULTY
OI - C.L. PEACOCK
OI - P.S. YOUNG

USAF GEOPHYS LAB
U OF KIEL
CLARKSON COLL OF TECH
NASA-MSFC
MISSISSIPPI STATE U

BRIEF DESCRIPTION

A PHOTOGRAPHIC EMULSION PACKAGE IS EXPOSED TO OBTAIN INFORMATION ON THE FLUX AND ENERGY SPECTRUM OF TRAPPED RADIATION.

----- SPACE SHUTTLE LDEF-A, FLAMAND-----

INVESTIGATION NAME- RULED AND HOLOGRAPHIC GRATINGS

NSSDC ID- SSLDEF -42

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - J. FLAMAND

INSTRUMENT SA/JOBIN-R

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO INVESTIGATE THE LONG-TERM STABILITY OF VARIOUS RULED AND HOLOGRAPHIC GRATINGS WHICH ARE USED IN SPACECRAFT OPTICAL AND ELECTRO-OPTICAL INSTRUMENTS.

----- SPACE SHUTTLE LDEF-A, GREGORY-----

INVESTIGATION NAME- THE INTERACTION OF ATOMIC OXYGEN WITH SOLID SURFACES AT ORBITAL ALTITUDE

NSSDC ID- SSLDEF -19

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - J.C. GREGORY
OI - P.N. PETERS

U OF ALABAMA
NASA-MSFC

BRIEF DESCRIPTION

THE MAIN OBJECTIVE OF THIS EXPERIMENT IS TO DETERMINE WHAT EFFECTS FROM THE IMPINGEMENT OF HIGH FLUXES OF ATOMIC OXYGEN ON VARIOUS SOLID SURFACES ARE MEASURABLE AND TO INVESTIGATE THE MECHANISMS OF INTERACTION. THIS IS ACCOMPLISHED BY USING A WIDE VARIETY OF MATERIALS, SOME NOT CHEMICALLY AFFECTED BY OXYGEN, AND ALTERING THE EXPOSURE, ANGLE OF INCIDENCE, AND TEMPERATURE OF THE SUBSTRATES BY THEIR POSITION ON THE LDEF SPACECRAFT AND BY EXPERIMENT DESIGN.

----- SPACE SHUTTLE LDEF-A, GRUBER-----

INVESTIGATION NAME- SPACE POWER EXPERIMENT

NSSDC ID- SSLDEF -11

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - R.P. GRUBER
OI - J.C. KOLECKI

NASA-LERC
NASA-LERC

BRIEF DESCRIPTION

THIS EXPERIMENT DEMONSTRATES A LOW-COST APPROACH USING COMMERCIALLY AVAILABLE HARDWARE FOR SPACE POWER APPLICATIONS LESS THAN 100 WATTS, AND OFFERS THE POTENTIAL FOR SIGNIFICANT SAVINGS IN FUTURE POWER SYSTEMS.

----- SPACE SHUTTLE LDEF-A, HANKS-----

INVESTIGATION NAME- SHUTTLE BAY ENVIRONMENT MEASUREMENTS

NSSDC ID- SSLDEF -29

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - B.R. HANKS
OI - J.P. YOUNG
OI - F.J. ON

NASA-LARC
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT WILL MEASURE THE ACOUSTIC, DYNAMIC, PRESSURE AND THERMAL ENVIRONMENTS A LARGE HEAVY PAYLOAD WILL EXPERIENCE IN THE SHUTTLE BAY DURING LAUNCH AND RE-ENTRY.

----- SPACE SHUTTLE LDEF-A, HICKEY-----

INVESTIGATION NAME- PASSIVE EXPOSURE OF EARTH RADIATION BUDGET EXPERIMENT COMPONENTS

NSSDC ID- SSLDEF -27

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - J.R. HICKEY
OI - F.J. GRIFFIN

EPPLEY LAB, INC
EPPLEY LAB, INC

BRIEF DESCRIPTION

EARTH RADIATION BUDGET (ERB) EXPERIMENTS REQUIRE ACCURACIES IN SOLAR AND EARTH FLUX RADIATION MEASUREMENTS IN FRACTIONAL PERCENTAGES. THIS EXPERIMENT EXPOSES ERB CHANNEL COMPONENTS, THEN RETRIEVES AND RESUBMITS THEM TO RADIOMETRIC CALIBRATION. CORRECTIONS ARE APPLIED TO ERB RESULTS. INFORMATION IS OBTAINED TO HELP SELECT COMPONENTS FOR FUTURE SOLAR AND ERB EXPERIMENTS.

----- SPACE SHUTTLE LDEF-A, HORZ-----

INVESTIGATION NAME- CHEMISTRY OF MICROMETEORIDS

NSSDC ID- SSLDEF -51

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST

PERSONNEL

PI - F. HORZ
OI - D.S. MCKAY
OI - D.A. MORRISON
OI - D.E. BROWNLEE
OI - R.M. HOUSLEY

NASA-JSC
NASA-JSC
NASA-JSC
U OF WASHINGTON
ROCKWELL INTL CORP

BRIEF DESCRIPTION

THE OBJECTIVE OF THE EXPERIMENT IS TO OBTAIN CHEMICAL ANALYSIS OF A STATISTICALLY SIGNIFICANT NUMBER OF MICROMETEORIDS. INFORMATION REGARDING THEIR DENSITY, SHAPE, AND MASS FLUX IS ALSO OBTAINED.

----- SPACE SHUTTLE LDEF-A, HUMES-----

INVESTIGATION NAME- SPACE DEBRIS IMPACT STUDY

NSSDC ID- SSLDEF -36

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - D.H. HUMES

NASA-LARC

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO DETERMINE THE TYPE AND DEGREE OF DAMAGE WHICH IS EXPECTED FROM METEOROID IMPACTS ON EXPOSED TARGETS OF SEVERAL DIFFERENT CONFIGURATIONS. THESE DATA SHOULD HELP IN THE DESIGN OF FUTURE SPACECRAFT WHICH BECAUSE OF THEIR SIZES AND EXPECTED LIFETIMES, WOULD OTHERWISE HAVE HIGH PROBABILITIES OF DAMAGE CAUSED BY METEOROID IMPACTS.

----- SPACE SHUTTLE LDEF-A, JOHNSTON-----

INVESTIGATION NAME- FIBER OPTICS EXPERIMENT

NSSDC ID- SSLDEF -03

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - A.R. JOHNSTON

NASA-JPL

BRIEF DESCRIPTION

THIS EXPERIMENT DETERMINES LONG-TERM DEGRADATION OF FIBER OPTIC DATA TRANSMISSION EQUIPMENT AND QUALIFY DESIGNS FOR MOUNTING TECHNIQUES, TERMINAL COUPLING, AND SHEATHS. FIBER OPTIC TRANSMISSION LINES ARE REQUIRED FOR FUTURE SATELLITES BECAUSE OF THEIR LARGE BANDWIDTHS, LACK OF ELECTROMAGNETIC INTERFERENCE PROBLEMS, LOW WEIGHT AND COST, AND SAFETY.

----- SPACE SHUTTLE LDEF-A, LAVOI-----

INVESTIGATION NAME- LARGE SPACE STRUCTURE LIGHTING
EVALUATION

NSSDC ID- SSLDEF -47

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - P.A. LAVOI
OI - E.J. REINBOLT

ILC TECHNOLOGY INC
NASA-MSFC

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO OBTAIN DATA WHICH PROVIDE A BASIS TO CONFIDENTLY SELECT LIGHTS FOR FUTURE LONG-DURATION SPACE APPLICATIONS, SUCH AS LARGE SPACE STRUCTURES. PRESENT STATE-OF-THE-ART LIGHTS ARE PLACED IN THE SPACE ENVIRONMENT WITH APPROPRIATE INSTRUMENTATION. A BASIC KNOWLEDGE OF THE OPERATION OF CONFINED PLASMA WITHOUT MODIFICATION BY CONVECTION SIGNIFICANTLY IMPROVES LAMPS DESIGNED FOR TERRESTRIAL USE.

----- SPACE SHUTTLE LDEF-A, LIND-----

INVESTIGATION NAME- GROWTH OF CRYSTALS FROM SOLUTIONS IN LOW
GRAVITY

NSSDC ID- SSLDEF -17

INVESTIGATIVE PROGRAM
CODE RS/CO-OP

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - M.D. LIND
OI - K.F. NIELSEN

ROCKWELL INTER SCI CTR
TECH U OF DENMARK

BRIEF DESCRIPTION

THIS EXPERIMENT DEVELOPS A NOVEL METHOD FOR GROWING CRYSTALS FROM SOLUTIONS. THIS METHOD CONSISTS OF ALLOWING TWO OR MORE REACTANT SOLUTIONS TO DIFFUSE SLOWLY TOWARDS EACH OTHER IN A REGION OF PURE SOLVENT IN WHICH THEY REACT TO FORM SINGLE CRYSTALS OF A DESIRED SUBSTANCE. SEVERAL CRYSTALS OF IMPORTANCE IN RESEARCH AND TECHNOLOGY ARE OF INTEREST.

----- SPACE SHUTTLE LDEF-A, LIND-----

INVESTIGATION NAME- INTERSTELLAR GAS

NSSDC ID- SSLDEF -48

INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - D.L. LIND
OI - J. GEISS
OI - F. BUHLER

NASA-JSC
U OF BERNE
U OF BERNE

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO ANALYZE THE INTERSTELLAR NOBLE GAS ATOMS WHICH PENETRATE THE HELIOSPHERE TO THE VICINITY OF THE EARTH. BY COLLECTING THESE PARTICLES AT SEVERAL LOCATIONS IN THE EARTH'S ORBIT, IT IS POSSIBLE TO STUDY THE DYNAMICS OF THE INTERSTELLAR WIND AS IT FLOWS THROUGH THE HELIOSPHERE AND INTERACTS WITH THE SOLAR PHOTON FLUX AND SOLAR WIND. THE EXPERIMENT ALSO INVESTIGATES CHARACTERISTICS OF THE INTERSTELLAR MEDIUM OUTSIDE THE REGION OF THE SOLAR SYSTEM.

----- SPACE SHUTTLE LDEF-A, MALHERBE-----

INVESTIGATION NAME- VACUUM DEPOSITED OPTICAL COATINGS

NSSDC ID- SSLDEF -41

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - A. MALHERBE

MATRA/SFOM OPTICAL DIV

BRIEF DESCRIPTION

THIS EXPERIMENT IS DESIGNED TO INVESTIGATE THE LONG-TERM STABILITY OF A WIDE RANGE OF VACUUM DEPOSITED OPTICAL COATINGS WHICH ARE USED IN SPACECRAFT OPTICAL AND ELECTRO-OPTICAL INSTRUMENTS.

----- SPACE SHUTTLE LDEF-A, MANDEVILLE-----

INVESTIGATION NAME- STUDY OF METEOROIDS IMPACT CRATERS ON
VARIOUS MATERIAL

NSSDC ID- SSLDEF -32

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST

PERSONNEL

PI - J.C. MANDEVILLE

CERT/ONERA

BRIEF DESCRIPTION

THE MAIN GOAL OF THIS EXPERIMENT IS TO STUDY IMPACT MICROCRATERS PRODUCED BY MICROMETER IMPACTS ON SELECTED MATERIALS (METALS, GLASSES, MINERALS) IN THE FORM OF THICK TARGETS. INTERPLANETARY DUST PARTICLES ARE EXPECTED TO FORM WELL-DEFINED CRATERS UPON IMPACTING THE EXPOSED MATERIALS AT VERY HIGH VELOCITY. THE STUDY OF CRATER FREQUENCY AND IMPACT FEATURES PRIMARILY GIVES DATA ON MASS-FLUX DISTRIBUTION OF MICROMETEOROIDS, AND TO A LESSER EXTENT PROVIDES VELOCITY MAGNITUDE AND DIRECTION.

----- SPACE SHUTTLE LDEF-A, MANDEVILLE-----

INVESTIGATION NAME- DUST DEBRIS COLLECTION WITH STACKED
DETECTORS

NSSDC ID- SSLDEF -33

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY
DUST

PERSONNEL

PI - J.C. MANDEVILLE

CERT/ONERA

BRIEF DESCRIPTION

THE AIM OF THIS EXPERIMENT IS TO INVESTIGATE, PRIMARILY, THE FEASIBILITY FOR FUTURE MISSIONS OF MULTILAYER THIN FILM DETECTORS ACTING AS ENERGY SORTERS IN ORDER TO COLLECT MICROMETEOROIDS, IF NOT IN THEIR ORIGINAL SHAPE, AT LEAST AS FRAGMENTS SUITABLE FOR CHEMICAL ANALYSIS.

----- SPACE SHUTTLE LDEF-A, MCDONNELL-----

INVESTIGATION NAME- MULTIPLE FOIL MICROABRASION
PACKAGE

NSSDC ID- SSLDEF -31

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST

PERSONNEL

PI - J.A.M. MCDONNELL
OI - D.G. ASHWORTH
OI - W.C. CAREY
OI - R.P. FLAVILL
OI - R.C. JENNISON

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BRIEF DESCRIPTION

THIS EXPERIMENT EVALUATES THE NEAR-EARTH PICO-PARTICLE ENVIRONMENT BY PENETRATION OF MICROMETER THICKNESS MULTIPLE-FOIL ARRAYS. RELIABLE DEFINITION OF THE SIZE, VELOCITY AND DISTRIBUTION OF THE NEAR-EARTH SOLID PARTICLE ENVIRONMENT AND PARTICLE COMPOSITION ANALYSIS SUPERSEDES RESULTS OBTAINED FROM OTHER RELATED PASSIVE EXPERIMENTS.

----- SPACE SHUTTLE LDEF-A, MCINTOSH, JR.-----

INVESTIGATION NAME- LOW TEMPERATURE HEAT PIPE EXPERIMENT

NSSDC ID- SSLDEF -12

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - R. MCINTOSH, JR.
OI - S. OLLENDORF
OI - C.R. MCCREIGHT

NASA-GSFC
NASA-GSFC
NASA-ARC

BRIEF DESCRIPTION

THIS EXPERIMENT EVALUATES THE PERFORMANCE CHARACTERISTICS IN THE SPACE ENVIRONMENT OF A FIXED CONDUCTANCE TRANSPORTER HEAT PIPE, A THERMAL DIODE HEAT PIPE, AND A LOW-TEMPERATURE PHASE CHANGE MATERIAL.

----- SPACE SHUTTLE LDEF-A, MILLER-----

INVESTIGATION NAME- INDUCED ENVIRONMENT CONTAMINATION
MONITOR

NSSDC ID- SSLDEF -30 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - E.R. MILLER NASA-MSFC
OI - J.A. FOUNTAIN NASA-MSFC
OI - R.C. LINTON NASA-MSFC

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURES THE MOLECULAR AND PARTICULATE
CONTAMINATION A MASSIVE PAYLOAD EXPERIENCES IN THE SHUTTLE BAY
DURING THE ORBITAL PERIOD, AND POSSIBLE PLUME IMPINGEMENT
DURING DEPLOYMENT OPERATIONS.

----- SPACE SHUTTLE LDEF-A, NICHOLS-----

INVESTIGATION NAME- EFFECTS OF SOLAR RADIATION ON GLASSES

NSSDC ID- SSLDEF -44 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - R.L. NICHOLS NASA-MSFC
OI - D.L. KINSER VANDERBILT U

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO DETERMINE THE
EFFECTS OF SOLAR RADIATION AND THE SPACE ENVIRONMENT ON THE
OPTICAL, MECHANICAL, AND CHEMICAL PROPERTIES OF VARIOUS
GLASSES.

----- SPACE SHUTTLE LDEF-A, O'SULLIVAN-----

INVESTIGATION NAME- HIGH RESOLUTION STUDY OF ULTRA HEAVY
COSMIC RAYS

NSSDC ID- SSLDEF -49 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS

PERSONNEL

PI - D. O'SULLIVAN DUBLIN INST ADV STUDY
OI - C.O. CEALLAIGH DUBLIN INST ADV STUDY
OI - A. THOMPSON DUBLIN INST ADV STUDY
OI - K.P. WENZEL ESA-ESTEC
OI - V. DOMINGO ESA-ESTEC

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO STUDY CHARGE AND ENERGY
SPECTRA OF COSMIC RAY NUCLEI, SUPER HEAVY NUCLEI, AND HEAVY
ANTINUCLEI. THE INFORMATION PROVIDED ASSISTS IN UNDERSTANDING
THE PHYSICAL PROCESSES OF COSMIC RAY NUCLEI PRODUCTION AND
ACCELERATION AT THE SOURCE IN INTERSTELLAR SPACE. INFORMATION
CONCERNING NUCLEOSYNTHESIS IS ALSO OBTAINED.

----- SPACE SHUTTLE LDEF-A, PAILLOUS-----

INVESTIGATION NAME- THERMAL COATINGS AND STRUCTURAL MATERIAL

NSSDC ID- SSLDEF -34 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - A. PAILLOUS CERT/ONERA
OI - J.C. GUILLAUMON CNES/CST

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO EXAMINE THE
VALIDITY OF GROUND SIMULATIONS OF THE SPACE ENVIRONMENT FOR
STUDIES OF DEGRADATION OF THERMAL CONTROL COATINGS USED ON
SATELLITES. COMPARISON IS MADE OF SAMPLE DEGRADATIONS FROM
BOTH GROUND TESTS AND ACTUAL FLIGHT TESTS.

----- SPACE SHUTTLE LDEF-A, POWELL-----

INVESTIGATION NAME- GRAPHITE/POLYIMIDE AND GRAPHITE/EPOXY
MECHANICAL PROPERTIES IN SPACE

NSSDC ID- SSLDEF -35 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - J.H. POWELL ROCKWELL INTL CORP
OI - D.W. WELCH ROCKWELL INTL CORP

BRIEF DESCRIPTION

THE PRIMARY OBJECTIVE OF GRAPHITE/POLYIMIDE TESTING IS TO
ACCUMULATE ACTUAL OPERATIONAL DATA IN THE SPACE ENVIRONMENT
OVER LONG PERIODS OF TIME. FROM THESE DATA DESIGN CRITERIA,
ASSOCIATED WITH MECHANICAL PROPERTIES OF FUTURE LIGHTWEIGHT
SPACE-ORIENTED STRUCTURAL COMPONENTS, ARE ESTABLISHED. THE
PRIMARY OBJECTIVE OF THE GRAPHITE/EPOXY SANDWICH TESTING IS TO
ACCUMULATE ACTUAL OPERATIONAL DATA ASSOCIATED WITH LONG
DURATION ORBITAL EXPOSURE AND TO VALIDATE MECHANICAL PROPERTIES
KNOCK DOWN FACTORS AS APPLIED TO THE DESIGN/ANALYSIS OF THE
EXISTING SPACE SHUTTLE GRAPHITE/EPOXY PAYLOAD BAY DOOR.

----- SPACE SHUTTLE LDEF-A, PREUSS-----

INVESTIGATION NAME- CRITICAL SURFACE DEGRADATION EFFECTS ON
COATINGS AND SOLAR CELLS

NSSDC ID- SSLDEF -46 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - L. PREUSS MBB SPACE DIV

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO INVESTIGATE THE
COMBINED EFFECTS OF RADIATION AND CONTAMINATION ON DIFFERENT
THERMAL COATINGS AND SOLAR CELLS WITH AND WITHOUT CONDUCTIVE
LAYERS TO PROVIDE DESIGN CRITERIA, TECHNIQUES AND TEST METHODS
TO ENSURE CONTROL OF COMBINED SPACE AND SPACECRAFT
ENVIRONMENTAL EFFECTS. THIS EXPERIMENT ALSO PROVIDES
QUALIFICATIONS FOR A NUMBER OF NEW COATINGS AND SOLAR CELLS.

----- SPACE SHUTTLE LDEF-A, RAND-----

INVESTIGATION NAME- BALLOON MATERIALS DEGRADATION

NSSDC ID- SSLDEF -38 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - J.L. RAND TEXAS A+M

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO ASSESS THE EFFECTS
OF LONG-TERM EXPOSURE OF CANDIDATE BALLOON FILMS, TAPES, AND
LINES TO THE SPACE ENVIRONMENT. DEGRADATION OF MECHANICAL AND
RADIOMETRIC PROPERTIES IS OBSERVED BY A SERIES OF TESTS ON THE
EXPOSED MATERIALS.

----- SPACE SHUTTLE LDEF-A, ROBERTSON-----

INVESTIGATION NAME- EFFECT OF SPACE EXPOSURE ON PYROELECTRIC
INFRARED DETECTORS

NSSDC ID- SSLDEF -18 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - J.B. ROBERTSON NASA-LARC
OI - I.O. CLARK NASA-LARC
OI - R.K. CROUCH NASA-LARC

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO DETERMINE THE
EFFECT OF LONG DURATION SPACE EXPOSURE AND LAUNCH ENVIRONMENT
ON THE PERFORMANCE OF PYROELECTRIC DETECTORS. PERFORMANCE
PARAMETERS (RESPONSIVITY, DETECTIVITY, AND SPECTRAL RESPONSE)
AND MATERIALS PROPERTIES (PYROELECTRIC COEFFICIENT AND
DIELECTRIC LOSS TANGENT) ARE MEASURED BEFORE AND AFTER
EXPOSURE.

----- SPACE SHUTTLE LDEF-A, ROBINSON, JR.-----

INVESTIGATION NAME- TRANSVERSE FLAT PLATE HEAT PIPE
PERFORMANCE

NSSDC ID- SSLDEF -37 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - G.A. ROBINSON, JR. NASA-MSFC
OI - F. EDELSTEIN GRUMMAN AEROSPACE CORP

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT IS TO DEMONSTRATE THE LONG-TERM OPERATION OF A HIGH-CAPACITY LIGHTWEIGHT HEAT PIPE IN A SUSTAINED ZERO-GRAVITY ENVIRONMENT. THE EXPERIMENT ALSO TESTS THE ABILITY OF THE HEAT PIPE TO REPRIME IN ZERO GRAVITY.

----- SPACE SHUTTLE LDEF-A, SCHALL-----

INVESTIGATION NAME- SPACE ENVIRONMENT EFFECTS ON SPACECRAFT MATERIALS

NSSDC ID- SSLDEF -15 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - P. SCHALL AEROSPACE CORP
OI - E.N. BORSON AEROSPACE CORP
OI - M.F. AMATEUA AEROSPACE CORP

BRIEF DESCRIPTION

MATERIALS SPECIMENS ARE ANALYZED TO UNDERSTAND CHANGES IN PROPERTIES AND STRUCTURE AFTER EXPOSURE TO SPACE ENVIRONMENT. THE EXPERIMENT WILL INCLUDE THE INVESTIGATION OF VARIOUS STRUCTURAL MATERIALS, SOLAR POWER COMPONENTS, THERMAL CONTROL MATERIALS, LASER COMMUNICATION COMPONENTS, LASER MINOR COATINGS, LASER-HARDENED MATERIALS, ANTENNA MATERIALS, AND ADVANCED COMPOSITES.

----- SPACE SHUTTLE LDEF-A, SCOTT, JR.-----

INVESTIGATION NAME- ATOMIC OXYGEN STIMULATED OUTGASSING

NSSDC ID- SSLDEF -07 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - R.L. SCOTT, JR. SOUTHERN U
OI - R.C. LITTON NASA-MSFC

BRIEF DESCRIPTION

THE EFFECT OF OXYGEN IMPINGEMENT ON THERMAL CONTROL SURFACE IN NEAR-EARTH ORBIT IS INVESTIGATED WITH REGARD TO THE PRODUCTION OF OPTICALLY DAMAGING OUTGASSING PRODUCTS. THE BIDIRECTIONAL REFLECTANCE OF SELECTED COATINGS IS MEASURED BEFORE AND AFTER SPACE EXPOSURE. DATA HELP DETERMINE IF ATOMIC OXYGEN IMPINGEMENT WAS A MAJOR FACTOR IN UNEXPLAINED SKYLAB CONTAMINATION BY PROVIDING AN UNDERSTANDING OF THE EFFECT OF ATOMIC OXYGEN ON THERMAL CONTROL SURFACES.

----- SPACE SHUTTLE LDEF-A, SEELEY-----

INVESTIGATION NAME- HIGH-PERFORMANCE INFRARED MULTILAYER FILTERS-RADIATION EFFECTS

NSSDC ID- SSLDEF -23 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - J.S. SEELEY READING U
OI - A. WHATLEY READING U
OI - R. HUNNEMAN READING U

BRIEF DESCRIPTION

THIS EXPERIMENT IS DESIGNED TO EXPOSE TO THE SPACE ENVIRONMENT INFRARED MULTILAYER INTERFERENCE FILTERS OF NOVEL DESIGN, CONSTRUCTION, AND MANUFACTURE, WHICH ARE USEFUL IN SENSING ATMOSPHERIC TEMPERATURE AND COMPOSITION. OPTICAL BEHAVIOR OF THESE FILTERS UNDER RADIATION IS NOT KNOWN AND IS CRITICAL TO THEIR PERFORMANCE.

----- SPACE SHUTTLE LDEF-A, SELLEN, JR.-----

INVESTIGATION NAME- SPACE PLASMA-HIGH VOLTAGE DRAINAGE

NSSDC ID- SSLDEF -09 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - J.M. SELLEN, JR. TRW SYSTEMS GROUP

BRIEF DESCRIPTION

THIS EXPERIMENT IS FLOWN TO DETERMINE THE LONG-TERM CURRENT DRAINAGE PROPERTIES OF THIN DIELECTRIC FILMS SUBJECTED TO HIGH-LEVEL ELECTRIC STRESS IN THE PRESENCE OF THE AMBIENT PLASMA AND SOLAR RADIATION. OBSERVED BEHAVIOR OF THESE FILMS WILL ESTABLISH ALLOWABLE LONG-TERM ELECTRIC STRESS LEVELS FOR SUCH FILMS, AS APPLIED TO SOLAR ARRAY AND SPACECRAFT THERMAL CONTROL COATING MATERIALS.

----- SPACE SHUTTLE LDEF-A, SHAPIRO-----

INVESTIGATION NAME- HEAVY IONS IN SPACE

NSSDC ID- SSLDEF -13 INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - M.M. SHAPIRO US NAVAL RESEARCH LAB
OI - F.W. O'DELL US NAVAL RESEARCH LAB
OI - R. SILBERBERG US NAVAL RESEARCH LAB
OI - C.H. TSAO US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

A STACK OF PASSIVE TRACK DETECTORS, INTERLEAVED WITH HEAVY METAL LAYERS, IS USED TO INVESTIGATE THE THREE COMPONENTS OF HEAVY NUCLEI IN SPACE (LOW-ENERGY NUCLEI N, O, NE, THE HEAVY NUCLEI OF THE VAN ALLEN BELTS, AND THE ULTRA-HEAVY NUCLEI, Z > 30, OF THE GALACTIC COSMIC RADIATION).

----- SPACE SHUTTLE LDEF-A, SLEMP-----

INVESTIGATION NAME- THERMAL CONTROL SURFACES(PASSIVE)

NSSDC ID- SSLDEF -05 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - W.S. SLEMP NASA-LARC
OI - R.A. BABCOCK, 3RD NASA-LARC

BRIEF DESCRIPTION

THIS EXPERIMENT DETERMINES THE EFFECTS OF SPACE EXPOSURE TO NEW COATINGS BEING DEVELOPED FOR SPACECRAFT THERMAL CONTROL. SAMPLES OF PAINTS, OTHER COATINGS AND SECOND-SURFACE MIRRORS ARE EXPOSED, SOME TO ALL ENVIRONMENTS OF THE MISSION AND SOME TO ONLY SPECIFIC ENVIRONMENTS. SPECTRAL REFLECTANCE OF THE SAMPLES IS MEASURED BEFORE AND AFTER THE MISSION.

----- SPACE SHUTTLE LDEF-A, SLEMP-----

INVESTIGATION NAME- SPACE EXPOSURE OF MATERIALS FOR ADVANCED SPACECRAFT

NSSDC ID- SSLDEF -21 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - W.S. SLEMP NASA-LARC

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO EVALUATE THE EFFECTS OF THE NEAR-EARTH ORBITAL ENVIRONMENT ON THE PHYSICAL AND CHEMICAL PROPERTIES OF COMPOSITE MATERIALS.

----- SPACE SHUTTLE LDEF-A, TAYLOR-----

INVESTIGATION NAME- SPACE ENVIRONMENT EFFECTS ON FIBER OPTIC SYSTEMS

NSSDC ID- SSLDEF -16 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - E.W. TAYLOR USAF WEAPONS LAB

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO QUALIFY FIBER OPTIC LINKS FOR FUTURE SPACE APPLICATIONS, AND TO DOCUMENT AND ANALYZE THE EFFECT OF THE NATURAL SPACE ENVIRONMENT ON LINK AND COMPONENT PERFORMANCE.

----- SPACE SHUTTLE LDEF-A, TENNYSON-----

INVESTIGATION NAME- PROPERTIES OF POLYMER MATRIX COMPOSITE MATERIALS, EFFECT OF SPACE ENVIRONMENT

NSSDC ID- SSLDEF -24 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - R.C. TENNYSON U OF TORONTO
OI - J.S. HANSEN U OF TORONTO

BRIEF DESCRIPTION

BY VARYING THE TIMES OF EXPOSURE TO THE SPACE ENVIRONMENT, THE CHANGES IN THE MECHANICAL PROPERTIES OF SEVERAL LIGHTWEIGHT COMPOSITE MATERIALS, INCLUDING GRAPHITE, BORON, S-GLASS, AND PRD-49 ARE STUDIED. PROPERTY DEGRADATION CAUSED BY MATRIX BREAKDOWN, OUTGASSING, THERMAL STRESSES, AND INTERNAL VOID CRACKS MUST BE KNOWN ABOUT THESE MATERIALS. ACTUAL SPECIMEN TEST RESULTS FROM SPACE ARE CORRELATED WITH GROUND TEST DATA AT AMBIENT CONDITIONS AND IN A THERMAL-VACUUM CHAMBER.

----- SPACE SHUTTLE LDEF-A, VENABLES-----

INVESTIGATION NAME- RADIATION SENSITIVITY OF QUARTZ CRYSTAL OSCILLATORS EXPERIMENT

NSSDC ID- SSLDEF -22 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - J.D. VENABLES MARTIN-MARIETTA LABS
OI - J.S. AHEARN MARTIN-MARIETTA LABS

BRIEF DESCRIPTION

THIS EXPERIMENT OBTAINS INFORMATION ON PREDICTING AND IMPROVING THE RADIATION SENSITIVITY OF QUARTZ CRYSTAL OSCILLATORS. THE EFFECTS OF EXPOSURE TO AN ORBITAL RADIATION ENVIRONMENT ARE COMPARED WITH RESULTS USING A TRANSMISSION ELECTRON MICROSCOPE. RADIATION-INDUCED FREQUENCY DRIFTS AND ACOUSTIC ABSORPTION IN THESE OSCILLATORS MUST BE MINIMIZED TO AVOID UNDESIRABLE VARIATIONS IN HIGH-PRECISION CLOCKS IN SATELLITES AND MISSILES. DATA OBTAINED FROM LDEF AND GROUND EXPERIMENTS PROVIDE GUIDES TO IMPROVE THE RADIATION HARDNESS OF THESE COMPONENTS.

----- SPACE SHUTTLE LDEF-A, WHITAKER-----

INVESTIGATION NAME- SOLAR ARRAY MATERIALS (PASSIVE)

NSSDC ID- SSLDEF -45 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - A.F. WHITAKER NASA-MSFC
OI - C.F. SMITH, JR. NASA-MSFC
OI - L.E. YOUNG NASA-MSFC
OI - H.W. BRANHORST, JR. NASA-LERC
OI - A.F. FORESTIERI NASA-LERC
OI - E.N. COSTOGUE NASA-JPL
OI - E.M. GADDY NASA-GSFC
OI - J.A. BASS NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT DETERMINES THE EFFECTS OF SPACE ON MECHANICAL, ELECTRICAL, AND OPTICAL PROPERTIES OF CANDIDATE LIGHTWEIGHT SOLAR ARRAY MATERIALS SUCH AS THOSE NEEDED FOR A SPACE STATION, A SATELLITE POWER STATION, AND SOLAR ELECTRIC PROPULSION SOLAR ARRAYS. DATA OBTAINED ON THE COMBINED EFFECTS OF ULTRAVIOLET, PENETRATING RADIATION AND VACUUM ON THESE MATERIAL PROPERTIES ALLOW SPACECRAFT MANUFACTURERS TO DESIGN SOLAR ARRAYS WITH MORE PREDICTABLE LIFETIMES.

----- SPACE SHUTTLE LDEF-A, WILKES-----

INVESTIGATION NAME- THERMAL CONTROL SURFACES

NSSDC ID- SSLDEF -04 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - D.R. WILKES NASA-MSFC
OI - H.M. KING NASA-MSFC

BRIEF DESCRIPTION

THIS EXPERIMENT DETERMINES THE EFFECTS OF SPACE EXPOSURE ON NEW COATINGS DEVELOPED FOR SPACECRAFT THERMAL CONTROL. SAMPLES ARE MOUNTED ON AN INDEXING WHEEL WITH A REFLECTOMETER THAT PERIODICALLY RECORDS REFLECTANCE VALUES IN SPACE.

***** SPACELAB 1*****

SPACECRAFT COMMON NAME- SPACELAB 1
ALTERNATE NAMES-

NSSDC ID- SPALAB1

LAUNCH DATE- 08/17/81 WEIGHT- 14500. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
INTERNATIONAL
UNITED STATES

ESA
NASA-OSS

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 89.4 MIN
PERIAPSIS- 250. KM ALT

INCLINATION- 57. DEG
APOAPSIS- 250. KM ALT

PERSONNEL

MM - R.E. PACE NASA-MSFC
MS - C.R. CHAPPELL NASA-MSFC
MG - R.G. NOBLITT NASA HEADQUARTERS
SC - M. WISKERCHEN NASA HEADQUARTERS
PM - D.C. JEAN NASA-MSFC

BRIEF DESCRIPTION

THE FIRST SPACELAB MISSION IS A JOINT NASA AND EUROPEAN SPACE AGENCY (ESA) MISSION. SPACELAB 1 CONSISTS OF A PRESSURIZED COMPARTMENT (MODULE) FOR HOUSING EQUIPMENT AND FLIGHT PERSONNEL AND A SPACE EXPOSED PLATFORM TO ACCOMMODATE INSTRUMENTS. THE COMPARTMENT AND PLATFORM ARE FLOWN INTO SPACE AND RETURNED INSIDE THE PAYLOAD COMPARTMENT OF THE SPACE SHUTTLE ORBITER. THE MISSION IS PLANNED TO LAST 7 DAYS, AND WHILE IN SPACE, THE ORBITER PAYLOAD COMPARTMENT DOORS ARE OPENED TO ALLOW VIEWING OF THE EARTH, SUN, AND DEEP SPACE. THE FOLLOWING INVESTIGATIONS ARE IN THE DEVELOPMENT PHASE: AN IMAGING SPECTROMETRIC OBSERVATORY, SPACE EXPERIMENTS WITH PARTICLE ACCELERATORS, STUDIES OF THE IONIZATION STATES OF SOLAR AND GALACTIC COSMIC RAY HEAVY NUCLEI, ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING, FAR UV OBSERVATIONS USING THE FAUST INSTRUMENT, HZE PARTICLE DOSIMETRY, NUTATION OF HELIANTHUS ANNUUS, VESTIBULAR EXPERIMENTS, INFLUENCE OF SPACE FLIGHT ON ERYTHROKINETICS IN MAN, CHARACTERIZATION OF PERSISTING CIRCADIAN RHYTHMS, VESTIBULO-SPINAL REFLEX MECHANISMS, EFFECTS ON PROLONGED WEIGHTLESSNESS, GEOPHYSICAL FLUID FLOW, WETTING-SPREADING AND OPERATING CHARACTERISTICS OF BEARING LUBRICANTS IN A ZERO GRAVITY ENVIRONMENT, TRIBOLOGICAL STUDIES OF FLUID-LUBRICATED JOURNAL BEARINGS, ACTIVE CAVITY RADIOMETER SOLAR IRRADIANCE MONITOR, ATMOSPHERIC TRACE MOLECULES OBSERVED BY SPECTROSCOPY, GRILLE SPECTROMETER, WAVES IN THE OH EMISSIVE LAYER, TEMPERATURE-WIND IN MESOSPHERE-THERMOSPHERE, H AND D LYMAN ALPHA, SOLAR SPECTRUM FROM 1900 A TO 4 MICROMETERS, LOW-ENERGY ELECTRONS, MAGNETIC FIELD MEASUREMENT, PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS, SOLAR CONSTANT, VERY WIDE FIELD CAMERA, X-RAY SPECTROSCOPY, HEAVY COSMIC RAY ISOTOPES, VESTIBULAR SLED, SLED EXPERIMENTS, LYMPHOCYTE PROLIFERATION IN WEIGHTLESSNESS, MASS DISCRIMINATION, MEASUREMENT OF INTRATHORACIC BLOOD PRESSURE, ADVANCED BIOSTACK, 3-DIMENSIONAL BALLISTOCARDIOGRAPHY, EFFECT OF RADIATION, ELECTROPHYSIOLOGICAL TAPE RECORDER, COLLECTION OF BLOOD SAMPLES, MATERIAL SCIENCE FACILITY, METRIC CAMERA, AND MICROWAVE SCATTEROMETER-RADIOMETER.

----- SPACELAB 1, ACKERMAN-----

INVESTIGATION NAME- GRILLE SPECTROMETER

NSSDC ID- SPALAB1-18 INVESTIGATIVE PROGRAM
CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL

PI - M. ACKERMAN BIRA
OI - D. FRIMONT BIRA
OI - A. GIRARD ONERA

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE (1) TO DETERMINE THE VERTICAL DISTRIBUTION PROFILES OF TRACE CONSTITUENTS IN THE STRATOSPHERE, MESOSPHERE, AND THERMOSPHERE IN ORDER TO STUDY THE CHEMICAL AND DYNAMICAL ATMOSPHERIC PROCESSES, AND (2) TO MONITOR, ON A LONG-TERM BASIS, MAN-MADE AND NATURAL ALTERATIONS OF THE NEAR-EARTH ENVIRONMENT. THE EQUIPMENT CONTAINS AN INFRARED SPECTROMETER WITH A TELESCOPE AND A COOLED INFRARED DETECTOR.

----- SPACELAB 1, ANDRESEN-----

INVESTIGATION NAME- ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER

NSSDC ID- SPALAB1-28 INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

PI - R.D. ANDRESEN ESA-ESTEC
OI - R.L.F. BOYD U COLLEGE LONDON
OI - G. BROWLIE U COLLEGE LONDON
OI - J.L. CULHANE U COLLEGE LONDON
OI - J. IVES U COLLEGE LONDON
OI - P.W. SANFORD U COLLEGE LONDON
OI - A. PEACOCK ESA-ESTEC
OI - B.G. TAYLOR ESA-ESTEC
OI - G. BOELLA U OF MILAN
OI - S. SALENI U OF PALERMO
OI - L. SCARSI U OF PALERMO
OI - G. VILLA U OF MILAN

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OF POOR QUALITY

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE (1) TO USE A GAS SCINTILLATION PROPORTIONAL COUNTER (1.5-50 KEV, 5-DEG FIELD OF VIEW, LESS THAN 10 PERCENT RESOLUTION AT 6 KEV) TO MEASURE SPECTRAL FEATURES OF GALACTIC X-RAY SOURCES, THE DIFFUSE X-RAY BACKGROUND, CLUSTERS OF GALAXIES, AND THE X-RAY FLUORESCENCE FROM THE EARTH'S ATMOSPHERE, AND (2) TO TEST CAPABILITY TO REJECT CHARGED PARTICLE BACKGROUND RADIATION WHOSE ENERGY IS NEAR THAT OF WEAK X-RAY SOURCES. THE EQUIPMENT IS A GAS SCINTILLATION COUNTER HAVING A 25-100 MICROMETER BERYLLIUM WINDOW, XENON CHAMBER, PHOTOMULTIPLIER DETECTOR, AND A PULSE HEIGHT ANALYZER.

----- SPACELAB 1, BEAUJEAN-----

INVESTIGATION NAME- ISOTOPE STACK

NSSDC ID- SPALAB1-29

INVESTIGATIVE PROGRAM
CODE SC/CO-OPINVESTIGATION DISCIPLINE(S)
COSMIC RAYS

PERSONNEL

PI - R.	BEAUJEAN	INST P+A NUCLEAR PHYS
OI - W.	ENGE	INST P+A NUCLEAR PHYS
OI - G.	SIEGNON	INST P+A NUCLEAR PHYS

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO USE A STACK OF PLASTIC SHEETS TO MEASURE HEAVY COSMIC-RAY NUCLEI (CHARGE $Z = 3$, 50 MEV PER NUCLEON TO 2 GEV PER NUCLEON), AND TO DETERMINE THE SOURCE, ACCELERATION, PROPAGATION, AND AGE OF COSMIC RAYS. THE EQUIPMENT CONSISTS OF A STACK OF LAYERS OF PLASTIC VISUAL TRACK DETECTORS HOUSED IN A SEALED ALUMINUM CONTAINER.

----- SPACELAB 1, BEGHIN-----

INVESTIGATION NAME- PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS

NSSDC ID- SPALAB1-25

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES

PERSONNEL

PI - C.	BEGHIN	CNRS, CTR FOR SPECTROM
OI - Y.	ARNAL	CNRS
OI - M.	HAMELIN	CNRS
OI - D.	HENRY	CNRS
OI - M.	PIRRE	CNRS
OI - J.J.	BERTHELIER	CNRS
OI - J.	LAUERENAT	CNRS
OI - B.N.	MAELHUM	NDRE
OI - J.	TROIM	NDRE
OI - R.	BOSWELL	ESA-ESTEC
OI - A.	GONFALONE	ESA-ESTEC
OI - T.R.	SANDERSON	ESA-ESTEC

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE TO USE AN ELECTRON AND ION BEAM GUN (UP TO 10 KEV), AN ASSOCIATED WAVE RECEIVER (UP TO 100 MHZ), ELECTRON TEMPERATURE PROBE, AND THREE PARTICLE DETECTORS TO: (1) STUDY IONOSPHERIC NEUTRALIZATION PROCESSES BY STUDYING THE STABILITY OF THE ELECTRONIC POTENTIAL OF THE GUN WITH RESPECT TO THE PLASMA, (2) STUDY PLASMA INSTABILITIES BY MEASURING ELECTRICAL (UP TO 100 MHZ) AND MAGNETIC (200 HZ UP TO 20 MHZ) WAVE COMPONENTS, (3) USE THE SHUTTLE MOTION TO PERFORM ION BOUNCE EXPERIMENTS, (4) STUDY THE D^+ INTERACTION WITH THE NEUTRAL ATMOSPHERE, AND (5) MONITOR THE SECONDARY ELECTRON FLUX. THE EQUIPMENT CONSISTS OF AN ACTIVE PACKAGE CONSISTING OF AN ELECTRON GUN, AN ION GUN (DEUTERIUM AND XENON), A PARTICLE DETECTOR, AND A PASSIVE PACKAGE CONTAINING AN ELECTRIC ANTENNA, MAGNETIC ANTENNA, AND TWO PARTICLE DETECTORS.

----- SPACELAB 1, BENTON-----

INVESTIGATION NAME- HZE-PARTICLE DOSIMETRY

NSSDC ID- SPALAB1-11

INVESTIGATIVE PROGRAM
CODE SBINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE BIOLOGY

PERSONNEL

PI - E.V.	BENTON	U OF CALIF, SAN FRANC.
OI - D.D.	PETERSON	U OF CALIF, SAN FRANC.
OI - R.M.	CASSOU	U OF CALIF, SAN FRANC.

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS EXPERIMENT ARE TO PROVIDE BASELINE DATA FOR EVALUATION OF RADIATION RISK TO MAN FROM HZE PARTICLES ON THIS AND FUTURE SPACELAB MISSIONS, AND TO CONTINUE A PROGRAM OF DOCUMENTATION OF HZE PARTICLE RADIATION INSIDE MANNED SPACECRAFT WHICH HAS INCLUDED APOLLO, SKYLAB, AND ASTP MISSIONS. THE EQUIPMENT CONSISTS OF: (1) A PASSIVE DOSIMETER PACKET (PDP) CONTAINING PLASTIC NUCLEAR TRACK DETECTORS, AN AGCL CRYSTAL DETECTOR (CD), AND THERMOLUMINESCENCE DETECTOR (TLD) CHIPS, AND (2) A THICK PLASTIC STACK (TPS) CONSISTING OF

A STACK OF 200 LEXAN POLYCARBONATE PLASTIC FILMS.

----- SPACELAB 1, BERTAUX-----

INVESTIGATION NAME- INVESTIGATION ON ATMOSPHERIC H AND D THROUGH THE MEASUREMENT OF LYMAN-ALPHA

NSSDC ID- SPALAB1-22

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
ATMOSPHERIC PHYSICS

PERSONNEL

PI - J.L.	BERTAUX	CNRS-SA
OI - G.	KOCKARTS	IASB

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE: TO USE A LYMAN-ALPHA PHOTOMETER EQUIPPED WITH H AND D ABSORPTION CELLS TO MEASURE DEUTERIUM EMISSION; TO OBSERVE PROTON PRECIPITATION IN THE AURORAL AND EQUATORIAL ZONES; TO USE A HYDROGEN ABSORPTION CELL AS A TECHNIQUE TO ELIMINATE THE INTERPLANETARY LYMAN-ALPHA BACKGROUND; TO OBSERVE THE SEPAC PROTON GUN INTERACTION WITH THE STS/SPACELAB ENVIRONMENT; AND TO ATTEMPT TO MEASURE ATMOSPHERIC HYDROGEN LYMAN-ALPHA EMISSIONS. THE EQUIPMENT CONSISTS OF A PHOTOMETER WITH AN ATOMIC HYDROGEN ABSORPTION CELL AND AN ATOMIC DEUTERIUM ABSORPTION CELL, AND A SOLAR BLIND PHOTOMULTIPLIER FOR DETECTOR.

----- SPACELAB 1, BISWAS-----

INVESTIGATION NAME- IONIZATION STATES OF SOLAR AND GALACTIC COSMIC RAY HEAVY NUCLEI STUDIES

NSSDC ID- SPALAB1-06

INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - S.	BISWAS	TATA INST OF FUND RES
PI - D.	LAL	PHYSICAL RESEARCH LAB
OI - R.	COWSIK	TATA INST OF FUND RES
OI - N.	DURGAPRASAD	TATA INST OF FUND RES
OI - V.	VENKATAVARADAN	TATA INST OF FUND RES
OI - S.	SARKAR	TATA INST OF FUND RES

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE TO MEASURE THE IONIZATION STATES OF HEAVY ELEMENTS (O TO FE) IN SOLAR COSMIC RAYS AND THE LOW-ENERGY GALACTIC COSMIC-RAY IONIZATION STATES. THE DETECTOR MODULE CONSISTS OF A THIN UPPER STACK OF KODAK CELLULOSE NITRATE (CN) PLASTIC SHEETS, A LOWER STACK OF KODAK CN WITH LEXAN POLYCARBONATE SHEETS AT THE BOTTOM, AND AN ELECTRONIC DRIVE SYSTEM.

----- SPACELAB 1, BOWYER-----

INVESTIGATION NAME- FAR UV OBSERVATIONS USING THE FAUST INSTRUMENT

NSSDC ID- SPALAB1-07

INVESTIGATIVE PROGRAM
CODE SC/CO-OPINVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - C.S.	BOWYER	U OF CALIF, BERKELEY
OI - G.C.	COURTES	CNRS-LAS
OI - J.M.	DEHARVENG	CNRS-LAS
OI - R.	MALINA	U OF CALIF, BERKELEY

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO PERFORM UV (1100-3500 A) BROADBAND IMAGING AND LOW-RESOLUTION (20-200 A) SPECTROSCOPY OF GLOBULAR CLUSTERS, GALACTIC CLUSTERS, QUASI-STELLAR OBJECTS, NEARBY GALAXIES, UV STARS, EXTENDED SOURCES, GEORCONA, AND SPACELAB 1 CONTAMINANTS. THE EQUIPMENT CONSISTS OF A FAR ULTRAVIOLET SPACE TELESCOPE (FAUST) AND AN ELECTRONIC INTERFACE MODULE.

----- SPACELAB 1, BROWN-----

INVESTIGATION NAME- MUTATION OF HELIANTHUS ANNUUS

NSSDC ID- SPALAB1-12

INVESTIGATIVE PROGRAM
CODE SBINVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL

PI - A.H.	BROWN	U OF PENNSYLVANIA
OI - A.O.	DAHL	U OF PENNSYLVANIA
OI - D.K.	CHAPMAN	U OF PENNSYLVANIA

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE TO: (1) DETERMINE QUANTITATIVELY WHETHER THE CONDITION OF SUSTAINED WEIGHTLESSNESS PRODUCES THE SAME DAMPING OR INHIBITING EFFECT ON PLANT NUTATION AS DOES ROTATION ON A HORIZONTAL CLINOSTAT ON EARTH, (2) MEASURE THE PERIOD AND AMPLITUDE OF ANY NUTATIONAL OSCILLATIONS BY THE SEEDLINGS WHICH MAY BE OBSERVED UNDER THE CONDITIONS OF SUSTAINED WEIGHTLESSNESS, AND (3) GAIN EXPERIENCE IN THE CONDUCT OF A PLANT PHYSIOLOGICAL EXPERIMENT IN A MULTIDISCIPLINARY SPACE LABORATORY IN WHICH DIVERSE FACILITIES ARE TO BE SHARED. THE EQUIPMENT CONSISTS OF -- DARK BOX, WITHIN WHICH FOUR TEST PLANTS ILLUMINATED BY INFRARED LIGHT ARE LOCATED IN THE FIELD OF VIEW OF A VIDEO CAMERA, ROTOR COMPARTMENTS, PLANT MODULES, BATTERY PACK, VIDEO TAPE DATA RECORDER, CONTROL ELECTRONICS, AND A CARRY-ON MODULE CONTAINER OF 28 PLANT MODULES.

----- SPACELAB 1, BUCKER-----

INVESTIGATION NAME- ADVANCED BIOSTACK EXPERIMENT

NSSDC ID- SPALAB1-32 INVESTIGATIVE PROGRAM
CODE SB/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - H. BUCKER DFLVR

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE TO INCREASE THE KNOWLEDGE OF HZE PARTICLES' EFFECT ON BIOLOGICAL SPECIMENS, TO ASSESS QUANTITATIVELY THE INTERFERENCE OF HZE PARTICLES WITH OTHER BIOLOGICAL STUDIES IN SPACE, TO DETERMINE THE DISTRIBUTION OF HZE PARTICLES AT DIFFERENT LOCATIONS IN THE MODULE AND ON THE PALLET, AND ESTABLISH RADIATION PROTECTION GUIDELINES FOR MAN AND BIOLOGICAL EXPERIMENTS IN FUTURE SPACE FLIGHTS. THE EQUIPMENT CONSISTS OF FOUR CYLINDERS WITH LAYERS OF DIFFERENT BIOLOGICAL OBJECTS BETWEEN DIFFERENT TRACK DETECTORS, INTEGRATING DOSIMETERS, AND SPECIALLY SELECTED TRACK DETECTORS.

----- SPACELAB 1, COGOLI-----

INVESTIGATION NAME- LYMPHOCYTE PROLIFERATION IN
WEIGHTLESSNESS

NSSDC ID- SPALAB1-36 INVESTIGATIVE PROGRAM
CODE SB/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - A. COGOLI U OF ZURICH

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO GAIN FURTHER INFORMATION ON THE TRIGGERING OF THE IMMUNORESPONSE AND ON THE MECHANISM OF EUKARYOTIC CELL DIFFERENTIATION DURING LONG-DURATION SPACEFLIGHTS. THE EQUIPMENT CONSISTS OF AN INCUBATOR, FOUR FLASKS OF HUMAN BLOOD, AND A VESSEL FOR LIQUID AIR.

----- SPACELAB 1, COURTES-----

INVESTIGATION NAME- VERY WIDE FIELD GALACTIC CAMERA

NSSDC ID- SPALAB1-27 INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
ZODIACAL LIGHT

PERSONNEL
PI - G.C. COURTES CNRS-LAS
OI - M. VITON CNRS-LAS
OI - J.P. SIVAN CNRS-LAS
OI - H.L. ATKINS NASA-MSFC

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO STUDY ZODIACAL LIGHT AND GEGENSCHIEIN, EXTENDED GALACTIC OBJECTS, SKY BACKGROUND, CONTINUUM LIGHT AND EMISSION LINES IN HII REGIONS, EXTENSION OF GALACTIC AND EXTRAGALACTIC MATERIAL, STARS AND STAR-LIKE OBJECTS, BRIGHT UV OBJECTS, DUST CONTAMINATION AROUND SPACELAB, AND EMISSION AND MORPHOLOGY STUDIES OF ATMOSPHERIC CONSTITUENTS, WITH WIDEFIELD (60 DEG) ULTRAVIOLET (130 TO 300 NM) AND SPECTROGRAPHIC PHOTOGRAPHY. THE EQUIPMENT CONSISTS OF A WIDE-FIELD CAMERA CONSISTING OF A HYPERBOLIC COLLECTOR, INTERCHANGEABLE SCHMIDT CHAMBERS (INCLUDING PRISM, FLAT MIRRORS AND FILTERS), REMOVABLE PROXIMITY-FOCUSED INTENSIFIER UTILIZING A CHANNEL ELECTRON MULTIPLIER ARRAY (CEMA) DETECTOR SYSTEM WITH A 100-FRAME FILM PACKAGE.

----- SPACELAB 1, CROMMELYNCK-----

INVESTIGATION NAME- ABSOLUTE MEASUREMENT OF THE SOLAR
CONSTANT

NSSDC ID- SPALAB1-26

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - D. CROMMELYNCK ROY METEOROL INST BELG
OI - V. DOMINGO ESA-ESTEC
OI - A.C. DUNEY ESA-ESTEC

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE (1) TO USE A SELF-CALIBRATING RADIOMETER TO MEASURE THE ABSOLUTE VALUE OF THE SOLAR CONSTANT AND TO MEASURE ANY LONG-TERM VARIATIONS IN THE SOLAR CONSTANT, AND (2) TO USE SURFACES OF FUSED SILICA AND METAL EXPOSED TO PALLET CONDITIONS TO DETERMINE THE AMOUNT OF DEGRADATION OF OPTICAL SURFACES DUE TO CONDITIONS ON THE SPACELAB PALLET. THE EQUIPMENT CONSISTS OF AN ABSOLUTE RADIOMETER WITH AN INBUILT STABILITY CHECK.

----- SPACELAB 1, ESA STAFF-----

INVESTIGATION NAME- METRIC CAMERA FACILITY

NSSDC ID- SPALAB1-38 INVESTIGATIVE PROGRAM
CODE ER/CO-OP

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

PERSONNEL
PI - ESA STAFF ESA-ESTEC

BRIEF DESCRIPTION

THE METRIC CAMERA FACILITY HAS A ZEISS RMK A 30/23 AERIAL SURVEY CAMERA AND A SKYLAB OPTICAL WINDOW, WITH THE FOLLOWING MAIN CHARACTERISTICS -- F = 305 MM, F-STOPS AVAILABLE - F/5.6, F/8, F/11, SHUTTER SPEEDS - 1/100 AND 1/1000 S, NEGATIVE SIZE - 23 X 23 CM (LENGTH FOR 450 PHOTOS PER MAGAZINE), ANGLE OF FIELD IS 56 DEG, AND A RESOLVING POWER OF 40 PER MM. BLACK AND WHITE, COLOR, AND COLOR IR FILMS CAN BE USED. THE MAIN TOPICS FOR THE PROPOSED MEASUREMENTS ARE ANALYTICAL MEASUREMENTS FOR CONTROL EXTENSION, TOPOGRAPHIC MAPPING, ORTHOPHOTOMAPPING, RESOLUTION EXPERIMENT, AND THERMATIC MAPPING AND INTERPRETATION.

----- SPACELAB 1, ESA STAFF-----

INVESTIGATION NAME- MICROWAVE FACILITY

NSSDC ID- SPALAB1-39 INVESTIGATIVE PROGRAM
CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
OCEANOGRAPHY

PERSONNEL
PI - ESA STAFF ESA-ESTEC

BRIEF DESCRIPTION

THE OBJECTIVES OF THE MICROWAVE FACILITY ARE TO DEVELOP ALL-WEATHER REMOTE SENSING METHODS, STUDY SENSOR-OBJECT INTERACTION BY MEASUREMENT OF OCEAN SURFACE WAVE SPECTRA WITH A DUAL-FREQUENCY SCATTEROMETER, AND VERIFY SYNTHETIC APERTURE RADAR BEHAVIOR. THE EQUIPMENT CONSISTS OF (1) AN ANTENNA-PARABOLIC DISK WITH DIRECT HORN FEEDING, ACTUAL APERTURE TBD, EFFECTIVE APERTURE ABOUT 2 M AZIMUTH AND 1 M ELEVATION, BEAMWIDTH OF 3 DEG, AND EFFICIENCY OF APPROXIMATELY 66 PERCENT, (2) A RECEIVER - COHERENT PULSE RECEIVER WITH FIXED NUMBER OF RANGE GATES, COHERENT PULSE RECEIVER AND A BROADBAND RADIOMETER, AND (3) HF ELECTRONICS - OPERATING FREQUENCY TBD (TO BE DETERMINED), CARRIER FREQUENCY 8.50 MHZ, AND AVERAGE RF POWER OF ABOUT 25 W.

----- SPACELAB 1, ESA STAFF-----

INVESTIGATION NAME- SPACE SLED FACILITY

NSSDC ID- SPALAB1-40 INVESTIGATIVE PROGRAM
CODE SB/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - ESA STAFF ESA-ESTEC

BRIEF DESCRIPTION

THE SPACE SLED FACILITY IS PROVIDED FOR VESTIBULAR RESEARCH ON HUMAN AND ANIMAL TEST SUBJECTS. VARIOUS ACCELERATION PROFILES ARE AVAILABLE, INCLUDING OSCILLATION AT A RATE OF 0.02 TO 1 HZ IN THE RANGE OF 0.1-0.5 EARTH'S GRAVITY, WITH SINUSOIDAL AND CONSTANT ACCELERATION. POSITIONING IS AVAILABLE 360 DEG AROUND THE UPRIGHT AXIS, AND PLUS OR MINUS 90 DEG AROUND THE LATERAL AXIS.

----- SPACELAB 1, ESA STAFF-----

INVESTIGATION NAME- SPACE PROCESSING LABORATORY

NSSDC ID- SPALAB1-42 INVESTIGATIVE PROGRAM
CODE EM/CO-OP

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - ESA STAFF ESA-ESTEC

BRIEF DESCRIPTION

THE SPACE PROCESSING LABORATORY CONSISTS OF THREE CATEGORIES -- SYSTEM EQUIPMENT, MATERIAL SCIENCES INSTRUMENTATION, AND MATERIAL SCIENCES EXPERIMENTS. THE CONCEPTUAL DESIGN OF THE GRADIENT HEATING FACILITY FOR HIGH TEMPERATURE IS ORIENTED TOWARDS TYPICAL METALLURGICAL, CRYSTAL GROWTH, AND GLASS EXPERIMENTS.

----- SPACELAB 1, FARMER-----

INVESTIGATION NAME- ATMOSPHERIC TRACE MOLECULES OBSERVED BY SPECTROSCOPY

NSSDC ID- SPALAB1-05 INVESTIGATIVE PROGRAM
CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - C.B. FARMER NASA-JPL
OI - R. BEER NASA-JPL
OI - J. BRECKINRIDGE NASA-JPL
OI - R. NORTON NASA-JPL
OI - O. RAPIER NASA-JPL
OI - R. SCHINDLER NASA-JPL
OI - F. TAYLOR NASA-JPL
OI - R. TOTH NASA-JPL
OI - R. ZANDER U OF LIEGE
OI - J. SHAW OHIO STATE U.
OI - J. SUSKIND NASA-GISS
OI - J.M. RUSSELL, 3RD NASA-LARC

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO USE HIGH-RESOLUTION, BROADBAND (2-16 MICROMETERS) INFRARED ABSORPTION SPECTRA TO (1) DETERMINE THE VARIABILITY OF MINOR AND TRACE CONSTITUENTS OF THE UPPER ATMOSPHERE ON A GLOBAL SCALE, AND TO STUDY CHARACTERISTIC RESIDENCE TIMES FOR THESE CONSTITUENTS, THE MAGNITUDE OF THEIR SOURCE AND SINKS, AND THEIR EFFECTS ON THE STABILITY OF THE ATMOSPHERE, AND (2) PROVIDE A CALIBRATED SPECTRAL BACKGROUND ATLAS ESSENTIAL FOR THE DESIGN OF ADVANCED INSTRUMENTATION TO BE USED FOR GLOBAL MONITORING OF CRITICAL ATMOSPHERIC SPECIES. THE EQUIPMENT CONSISTS OF A RAPID-SCAN, FOURIER-INTERFERENCE, SPECTROMETER SYSTEM CONTAINING: (1) AN OPTICAL SYSTEM CONSISTING OF THE BASIC INTERFEROMETER, FOREOPTICS, DETECTOR OPTICS, SUNTRACKER, PHOTO CAMERA, CRYOSTAT AND FILTER WHEEL, (2) A CONTINUOUS-SCAN SERVO-SYSTEM, (3) AN IR SIGNAL-HANDLING SYSTEM, (4) A DATA-HANDLING SYSTEM, (5) A CONTROL/MONITORING SYSTEM, AND (6) THE IR COOLING SYSTEM AND PRESSURIZATION SYSTEM.

----- SPACELAB 1, GAUER-----

INVESTIGATION NAME- MEASUREMENT OF (CENTRAL) VENOUS PRESSURE BY PUNCTURING AN ARM VEIN

NSSDC ID- SPALAB1-31 INVESTIGATIVE PROGRAM
CODE SB/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - O.H. GAUER U OF BERLIN
OI - KOCH U OF BERLIN
OI - ROCKER U OF BERLIN
OI - KIRSCH U OF BERLIN

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO PROCURE ABSOLUTE DATA THAT THE ADAPTION OF MINERAL AND WATER METABOLISM TO THE WEIGHTLESS CONDITION IS INITIATED BY THE ENGORGEMENT OF THE CEPHALAD CIRCULATION. THE EQUIPMENT CONTAINS A STRAIN GAGE MANOMETER, TAPE RECORDER, AND BATTERIES.

----- SPACELAB 1, GAUER-----

INVESTIGATION NAME- COLLECTION BLOOD SAMPLES FOR DETERMINING A.D.H., ALDOSTERONE, AND OTHER HORMONES

NSSDC ID- SPALAB1-37 INVESTIGATIVE PROGRAM
CODE SB/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - O.H. GAUER U OF BERLIN
OI - KIRSCH U OF BERLIN
OI - KOCH U OF BERLIN
OI - ROCKER U OF BERLIN
OI - H. STOBOY U OF BERLIN

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS THE CONFIRMATION AND COMPLETION OF SIMILAR WORK IN THE SKYLAB FLIGHTS, AND ATTEMPT TO FIND A CONNECTION WITH CIRCULATORY PARAMETERS. THE EQUIPMENT IS A CENTRIFUGE AND A STORAGE CONTAINER AT MINUS 20 DEG C.

----- SPACELAB 1, GAUSE-----

INVESTIGATION NAME- TRIBOLOGICAL STUDIES OF FLUID LUBRICANT JOURNAL

NSSDC ID- SPALAB1-10 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - R.L. GAUSE NASA-MSFC
PI - A.F. WHITAKER NASA-MSFC

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE TO (1) DETERMINE THE EFFECT OF ZERO GRAVITY ON THE OPERATION OF FLUID-LUBRICATED JOURNAL BEARINGS, (2) OBSERVE FLUID FLOW-SURFACE WETTING AND HYDRODYNAMIC FLUID FORMATION IN JOURNAL BEARINGS OPERATING IN ZERO GRAVITY, (3) OBSERVE AND MEASURE DYNAMIC INSTABILITIES IN HYDRODYNAMIC BEARINGS IN ZERO GRAVITY, (4) EVALUATE THE USE OF MAGNETIC FIELDS AND FERROLUBRICANTS FOR PREVENTING DYNAMIC INSTABILITY IN JOURNAL BEARINGS OPERATING IN ZERO GRAVITY, AND (5) EVALUATE THE USE OF MAGNETIC FIELDS FOR CONTROLLING FERROFLUIDS IN ZERO GRAVITY. EQUIPMENT CONSISTS OF TYPICAL JOURNAL BEARING AND LUBRICANT, FERROFLUID LUBRICATED MAGNETIC JOURNAL, TRANSPARENT BEARINGS TO FACILITATE PHOTOGRAPHY AND OBSERVATION, AND A CAMERA.

----- SPACELAB 1, GREEN-----

INVESTIGATION NAME- ELECTRO-PHYSIOLOGICAL TAPE RECORDER

NSSDC ID- SPALAB1-35 INVESTIGATIVE PROGRAM
CODE SB

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - H.L. GREEN CLINICAL RES CENTER
OI - F.D. STOTT CLINICAL RES CENTER
OI - H.S. WOLFF CLINICAL RES CENTER

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO STUDY ACCLIMATISATION OF ASTRONAUTS TO ZERO GRAVITY BY MEANS OF AN ELECTROCARDIOGRAPH (ECG), ELECTROENCEPHALOGRAPH (EEG), ELECTRO-OCULOGRAPH (EOG), AND POSSIBLY ELECTROMYOGRAPH (EMG) ON A CONTINUOUS BASIS BY A MINIATURE TAPE RECORDER ATTACHED TO THE CREW MEMBER. THE EQUIPMENT CONSISTS OF ECG, EEG, AND EOG ELECTRODES, PREAMPLIFIER, TAPE RECORDER, AND BATTERIES.

----- SPACELAB 1, HART-----

INVESTIGATION NAME- GEOPHYSICAL FLUID FLOW

NSSDC ID- SPALAB1-08 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
ASTRONOMY

PERSONNEL
PI - J.E. HART U OF COLORADO
OI - J. TOOMRE U OF COLORADO
OI - P. GILMAN HIGH ALTITUDE OBS
OI - G. FICHTL NASA-MSFC

BRIEF DESCRIPTION

THERE ARE TWO EXPERIMENT OBJECTIVES. ONE OBJECTIVE OF THIS EXPERIMENT IS TO UNDERSTAND THE CONVECTION OF STARS AND THE SUN BY -- (1) STUDYING THE ONSET OF CONVECTION BETWEEN CONCENTRIC SPHERES AS A FUNCTION OF IMPOSED TEMPERATURE DIFFERENCES AND ROTATION, (2) STUDYING THE SHAPES OF THE CONVECTION CELLS AT THE ONSET OF CONVECTION AND ITS EVOLUTION, (3) STUDYING THE INTERACTIVE MOTIONS SUCH AS MEAN AZIMUTHAL FLOWS OBSERVED ON THE SOLAR EQUATORIAL REGION. THE OTHER OBJECTIVE IS TO ACT AS THE FORERUNNER OF A SERIES OF PROPOSED EXPERIMENTS TO STUDY THE BAROCLINIC PROPERTIES OF THE EARTH'S ATMOSPHERE AND THE GENERAL CIRCULATION OF THE EARTH'S OCEAN BASINS. THE EQUIPMENT CONSISTS OF AN ELECTROCONVECTION CELL, CONTROLLERS, AND A CAMERA.

----- SPACELAB 1, HERSE-----

INVESTIGATION NAME- WAVES IN THE OH EMISSIVE LAYER

NSSDC ID- SPALAB1-19

INVESTIGATIVE PROGRAM
CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
ATMOSPHERIC PHYSICS

PERSONNEL

PI - M. HERSE CNRS-SA
OI - G. MOREELS CNRS-SA

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE TO STUDY THE LARGE-SCALE STRUCTURE OF THE ATMOSPHERIC OH EMISSION, AND TO INVESTIGATE POSSIBLE RELATIONS BETWEEN THE OH EMISSION STRUCTURE AND OROGRAPHY OR METEOROLOGICAL PHENOMENA. THE EQUIPMENT CONTAINS AN IMAGE INTENSIFIER WITH A CAMERA, FILTER, AND 16-MM MOVIE CAMERA WITH A 25-MM F/0.95 LENS.

----- SPACELAB 1, HONECK-----

INVESTIGATION NAME- MICRO-ORGANISMS AND BIOMOLECULES IN THE SPACE ENVIRONMENT

NSSDC ID- SPALAB1-34

INVESTIGATIVE PROGRAM
CODE SB/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL

PI - S. HONECK U OF FRANKFURT
OI - C. THOMAS-GORFIAS U OF FRANKFURT
OI - G. REITZ U OF FRANKFURT

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE TO -- (1) MEASURE QUANTITATIVELY THE EFFECTS OF SPACE PARAMETERS (VACUUM, SOLAR UV-RADIATION) ON MICROBIAL BACTERIAL SPORES, BACTERIAL VEGETATIVE CELLS, BACTERIOPHAGES AND ENZYMES, AND TO UNDERSTAND THE EFFECTS ON THESE SAMPLES; (2) EVALUATE THE CONSEQUENCES OF GENETIC AND RESPONSE ALTERATIONS; AND (3) COMPARE THE RESULTS WITH SIMULATION EXPERIMENTS PERFORMED IN THE LABORATORY. THE EQUIPMENT IS A BOX ACCOMMODATING 100 TO 200 BIOLOGICAL SAMPLES.

----- SPACELAB 1, KIMZEY-----

INVESTIGATION NAME- INFLUENCE OF SPACEFLIGHT ON ERYTHROKINETICS IN MAN

NSSDC ID- SPALAB1-14

INVESTIGATIVE PROGRAM
CODE SB

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL

PI - S.L. KIMZEY NASA-JSC
OI - W.H. CROSBY SCRIPPS C+R FOUNDATION
OI - M. TAVASSOLI SCRIPPS C+R FOUNDATION
OI - P.C. JOHNSON BAYLOR U
OI - J.P. CHEN U OF TENNESSEE
OI - C.D.R. DUNN U OF TENNESSEE
OI - R.D. LANGE U OF TENNESSEE
OI - E.C. LARKIN VETERANS ADMIN HOSP

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO OBTAIN NEW AND SPECIFIC INFORMATION PERTAINING TO THE MECHANISM AND SITE OF ACTION RELATIVE TO THE RED BLOOD CELL MASS AND PLASMA VOLUME CHANGES OBSERVED DURING SPACE FLIGHT. THE EQUIPMENT CONSISTS OF AN IN-FLIGHT BLOOD COLLECTION SYSTEM AND A REFRIGERATOR.

----- SPACELAB 1, MENDE-----

INVESTIGATION NAME- ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING

NSSDC ID- SPALAB1-03

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL

PI - S.B. MENDE LOCKHEED PALO ALTO
OI - R.H. EATHER BOSTON COLLEGE
OI - R.J. NAUMANN NASA-MSFC
OI - D.L. REASONER NASA-MSFC
OI - G.R. SWENSON NASA-MSFC
OI - B.J. DUNCAN NASA-MSFC
OI - S. CLIFTON NASA-MSFC

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE TO (1) INVESTIGATE THE UPPER ATMOSPHERIC TRANSPORT PROCESSES THROUGH THE MEASUREMENT OF RESONANT SCATTERED EMISSIONS FROM POSITIVE MG IONS, (2) MEASURE EXCITATION CROSS SECTIONS OF UPPER ATMOSPHERIC CONSTITUENTS USING INJECTED PARTICLE BEAMS AND DETECTION OF THE RESULTING EMISSIONS, (3) INVESTIGATE ATMOSPHERIC COMPOSITION AND ENERGY BUDGET THROUGH OBSERVATIONS OF NATURAL AURORA, (4)

OBSERVE LARGE- AND SMALL-SCALE AURORAL MORPHOLOGY AND COMPARE ULTRAVIOLET AND VISIBLE AURORA FEATURES, (5) SUPPORT THE ELECTRON ACCELERATOR IN CONDUCTING MEASUREMENTS OF MAGNETOSPHERIC ELECTRIC FIELDS, AND (6) MEASURE SMALL PARTICULATE CONTAMINATION AROUND THE SHUTTLE/ SPACELAB. THE EQUIPMENT CONSISTS OF -- (1) A DUAL-CHANNEL VIDEO SYSTEM WITH ASSOCIATED OPTICS AND DATA HANDLING ELECTRONICS MOUNTED ON A STABILIZED PLATFORM FOR POINTING AND CONTROL, (2) SEC VIDICON FOR HIGH-SENSITIVITY, HIGH-RESOLUTION OPERATION, (3) A LOW-RESOLUTION MICROCHANNEL PLATE ARRAY OPERATING IN A PHOTON COUNTING MODE, AND (4) COMS AND ONBOARD RECORDERS UTILIZED FOR DATA DISPLAY AND RECORDING.

----- SPACELAB 1, OBAYASHI-----

INVESTIGATION NAME- SPACE EXPERIMENTS WITH PARTICLE ACCELERATORS (SEPAC)

NSSDC ID- SPALAB1-02

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - T. OBAYASHI U OF TOKYO
OI - J.M. SELLEN, JR. TRW SYSTEMS GROUP
OI - J.L. BURCH U OF TEXAS, SAN ANTONIO
OI - C.R. CHAPPELL NASA-MSFC
OI - W.T. ROBERTS NASA-MSFC

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE TO USE AN ELECTRON BEAM ACCELERATOR AND A MAGNETO-PLASMA DYNAMIC ARCJET TO STUDY: (1) AURORAL PRODUCTION IN THE UPPER ATMOSPHERE, (2) IONOSPHERE PARAMETERS SUCH AS ANOMALOUS RESISTIVITY, PLASMA COUPLING PROCESS, ELECTRIC AND MAGNETIC FIELD MORPHOLOGY, VEHICLE CHARGE NEUTRALIZATION, SHUTTLE/SPACELAB INDUCED ENVIRONMENTS, ELECTRON BEAM/ NEUTRAL PLUME INTERACTION, THE COUPLING BETWEEN THE EARTH'S ATMOSPHERE AND MAGNETOSPHERE, AND (3) THE EFFECTS OF PARTICLE INTERACTIONS ON ATMOSPHERIC DYNAMICS. THE EQUIPMENT CONSISTS OF AN ELECTRON BEAM ACCELERATOR, MAGNETO-PLASMA DYNAMIC ARCJET, BATTERY/CAPACITOR BANK TO PROVIDE HIGH DISCHARGE CURRENT, MONITOR AND DIAGNOSTIC DEVICES, AND CONTROL, DISPLAY, AND DATA MANAGEMENT SYSTEMS.

----- SPACELAB 1, PAN-----

INVESTIGATION NAME- BEARING LUBRICANT WETTING, SPREADING AND OPERATING CHARACTERISTICS IN ZERO-G

NSSDC ID- SPALAB1-09

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - C.H.T. PAN SHAKER RESEARCH CORP

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE TO -- (1) DETERMINE THE EXTENT TO WHICH SELECTED COMMERCIAL LUBRICANT WETTABILITY IS AFFECTED BY A ZERO-GRAVITY ENVIRONMENT, (2) DETERMINE HOW BEARING TORQUE, BEARING LUBRICANT FEEDING, AND BEARING OPERATING FILMS ARE ALTERED BY OPERATIONS IN ZERO GRAVITY, (3) COMPARE RESULTS WITH LABORATORY RESEARCH OF COMMERCIAL APPLICATIONS, AND (4) PROVIDE DATA FOR APPLICATIONS IN SPACE HARDWARE. THE EQUIPMENT CONSISTS OF PLATES FOR LUBRICANT WETTING AND SPREADING TESTS, HYDRODYNAMIC JOURNAL BEARING, AND AN AVAILABLE FLIGHT CAMERA.

----- SPACELAB 1, RESCHKE-----

INVESTIGATION NAME- VESTIBULO-SPINAL REFLEX MECHANISMS

NSSDC ID- SPALAB1-16

INVESTIGATIVE PROGRAM
CODE SB

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL

PI - M.F. RESCHKE NASA-JSC
OI - J.L. HOMICK NASA-JSC
OI - D.J. ANDERSON U OF MICHIGAN

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE TO USE THE ESA SLED TO DETERMINE IF THE VESTIBULO-SPINAL REFLEX MEASUREMENT TECHNIQUE (H-REFLEX) IS SUITABLE AS AN EFFECTIVE PREDICTOR OF SUSCEPTIBILITY TO SPACE MOTION SICKNESS, AND TO STUDY THE RELATIONSHIP BETWEEN MOTION SICKNESS SENSITIVITY ON THE EARTH WITH CHANGES IN POSTURAL REFLEXES OBSERVED IN FLIGHT. THE EQUIPMENT CONSISTS OF A SLED FACILITY, POWER MODULE CONTAINING PULSE GENERATOR-OSCILLOSCOPE DIFFERENTIAL AMPLIFIER AND MICROPROCESSOR, PREAMPLIFIER, STIMULUS ISOLATION UNIT, AND ELECTRODE KIT.

----- SPACELAB 1, ROSS-----

INVESTIGATION NAME- MASS DISCRIMINATION DURING
WEIGHTLESSNESS

NSSDC ID- SPALAB1-30 INVESTIGATIVE PROGRAM
CODE SB/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - H. ROSS U OF STIRLING

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVE IS TO COMPARE MASS
DISCRIMINATION WHEN BOTH THE OBSERVER AND THE TEST OBJECTS ARE
WEIGHTLESS, WITH WEIGHT DISCRIMINATION UNDER NORMAL GRAVITY.
THE EQUIPMENT IS A BOX CONTAINING WEIGHTED TINS, A BLINDFOLD,
INSTRUCTIONS, AND RECORD CARDS.

----- SPACELAB 1, SCANO-----

INVESTIGATION NAME- BALLISTOCARDIOGRAPHIC RESEARCH IN
WEIGHTLESSNESS

NSSDC ID- SPALAB1-33 INVESTIGATIVE PROGRAM
CODE SB/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - A. SCANO U OF ROME

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE TO RECORD A
THREE-DIMENSIONAL BALLISTOCARDIOGRAM (BCG) IN RESTING
WEIGHTLESS MAN AND COMPARE IT WITH SIMILAR TRACINGS RECORDED ON
THE SAME SUBJECT IN GROUND CONDITIONS, POSSIBLY TO FIND BCG
MODIFICATIONS IN RELATION TO CARDIOVASCULAR ADAPTATIONS TO
WEIGHTLESSNESS, AND TO RECORD OTHER BODY ACCELERATIONS IN
RELATION TO DIAPHRAGM DYNAMICS DURING SPONTANEOUS BREATHING,
HYPERVENTILATION, AND COUGH. THE EQUIPMENT CONSISTS OF THREE
SERVO-ACCELEROMETERS AND ONE ELECTROCARDIOGRAPH (ECG) RECORDER
WITH FOUR CHANNELS.

----- SPACELAB 1, SULZMAN-----

INVESTIGATION NAME- CHARACTERIZATION OF PERSISTING
CIRCADIAN RHYTHMS

NSSDC ID- SPALAB1-15 INVESTIGATIVE PROGRAM
CODE SB

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - F.M. SULZMAN HARVARD U
OI - M.C. MOORE HARVARD U

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE TO (1) TEST IF CIRCADIAN
RHYTHMS PERSIST OUTSIDE THE EARTH'S ENVIRONMENT, AND TO
DETERMINE IF THE CIRCADIAN TIMING SYSTEM IS EXOGENOUS OR
ENDOGENOUS, AND (2) EXAMINE THE INFLUENCE OF THE SPACE
ENVIRONMENT ON THE CIRCADIAN ORGANIZATION. THE EQUIPMENT
CONSISTS OF A LIGHT-TIGHT BOX CONTAINING 24 GROWTH TUBES.

----- SPACELAB 1, THEILE-----

INVESTIGATION NAME- DC AND LOW FREQUENCY VECTOR MAGNETOMETER

NSSDC ID- SPALAB1-23 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - B. THEILE BRAUNSCHWEIG TECH U

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE TO USE A THREE-AXIS
FLUXGATE MAGNETOMETER TO STUDY; (1) MAGNETIC FIELDS OF THE
IONOSPHERIC POLAR ELECTROJET AND ITS RETURN CURRENT, EQUATORIAL
ELECTROJET, AND THE SOLAR QUIET CURRENT, (2) THE VECTOR
MAGNETIC FIELD AS A PLASMA PARAMETER, AND (3) THE SPACELAB
MAGNETIC FIELD BACKGROUND. THE EQUIPMENT CONSISTS OF TWO
SEPARATE THREE-AXIS FLUXGATE SENSORS.

----- SPACELAB 1, THUILLIER-----

INVESTIGATION NAME- TEMPERATURE AND WIND MEASUREMENTS IN THE
MESOSPHERE AND THERMOSPHERE

NSSDC ID- SPALAB1-20

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL
PI - G. THUILLIER CNRS-SA
OI - J.E. BLAMONT CNRS-SA
OI - M.L. DUBOIN CNRS-SA
OI - P. CONNES PARIS OBSERVATORY

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE TO USE A MICHELSON
INTERFEROMETER TO (1) DETERMINE THE TEMPERATURE AND WIND
PROFILES FROM THE TOP OF THE MESOSPHERE TO THE THERMOSPHERE BY
ANALYSIS OF THE LINE WIDTHS AND DOPPLER SHIFTS OF NATURAL
EMISSION OF DAYGLOW AND NIGHTGLOW CONSTITUENTS, AND (2) TO USE
THIS EXPERIMENT AS A DEMONSTRATION FOR MORE SOPHISTICATED
INSTRUMENTS TO BE FLOWN ON FUTURE MISSIONS. THE EQUIPMENT
CONSISTS OF THREE FIELD-COMPENSATED MICHELSON INTERFEROMETERS,
A HIGH-RESOLUTION INSTRUMENT, AND A CASSEGRAIN TELESCOPE.

----- SPACELAB 1, THUILLIER-----

INVESTIGATION NAME- MEASUREMENT OF THE SOLAR SPECTRUM FROM
190 TO 4000 NANOMETERS

NSSDC ID- SPALAB1-21 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - G. THUILLIER CNRS-SA
PI - P. SIMON IASP
OI - J.E. BLAMONT CNRS-SA
OI - R. PASTIELS IASP
OI - D. LABS LANDESTERNAWART

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVE IS TO MEASURE THE SOLAR SPECTRAL
IRRADIANCE WITH AN ACCURACY OF 0.1 PERCENT IN ORDER TO
DETERMINE SOLAR CONSTANT, VARIATIONS IN SOLAR CONSTANT WITH
SOLAR CYCLE USING SPACELAB/STS FLIGHTS OVER A 10-YEAR PERIOD,
AND VARIATIONS OF IRRADIANCE WITHIN EACH SPECTRAL REGION. THE
EQUIPMENT CONSISTS OF THREE GRATING SPECTROMETERS COVERING UV -
190.0 TO 370.0 NM (1 NM BANDPASS), VISIBLE - 350.0 TO 1100 NM
(1 NM BANDPASS), AND IR - 1000 TO 4000 NM (10 NM BANDPASS).

----- SPACELAB 1, TORR-----

INVESTIGATION NAME- AN IMAGING SPECTROMETRIC OBSERVATORY

NSSDC ID- SPALAB1-01 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - M.R. TORR U OF MICHIGAN
OI - A.L. BROADFOOT KITT PEAK NATL OBS
OI - D.E. SHERANSKY U OF SOUTHERN CALIF
OI - B.R. SANDEL U OF SOUTHERN CALIF
OI - S.K. ATREYA U OF MICHIGAN
OI - G.R. CARIGNAN U OF MICHIGAN
OI - J.C.G. WALKER ARECIBO OBSERVATORY
OI - D.G. TORR U OF MICHIGAN
OI - T.M. DONAHUE U OF MICHIGAN

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS EXPERIMENT ARE (1) TO PRODUCE THE
FIRST DAYTIME SPECTRUM (200-12,000 A, 3-6 A RESOLUTION)
EMISSIONS OF ATMOSPHERIC METASTABLE SPECIES, ATMOSPHERIC
MOLECULAR NITROGEN SYSTEMS, MESOSPHERE AND LOWER THERMOSPHERE
TRACE CONSTITUENTS, ATMOSPHERIC HELIUM AND HYDROGEN; (2) TO
MONITOR THE SHUTTLE-INDUCED CONTAMINATION; AND (3) TO SERVE AS
THE PRECURSOR FOR FUTURE SHUTTLE OBSERVING PROGRAMS USING THIS
OBSERVATORY. THE EQUIPMENT CONSISTS OF (1) A BROADBAND
INSTRUMENT DESIGNED FOR HIGH-SPEED OPERATION; (2) AN INSTRUMENT
COMPOSED OF FIVE CO-ALIGNED IDENTICAL SPECTROMETERS, EACH
RESTRICTED TO A GIVEN SPECTRAL RANGE WITHIN THE SELECTED FIELD
OF VIEW; AND (3) A MIRROR ON THE COVER USED FOR IMAGE
STABILIZING, HEIGHT SCANNING OR TRACKING.

----- SPACELAB 1, VON BAUMGARTEN-----

INVESTIGATION NAME- HUMAN VESTIBULAR REACTIONS AND SENSATION
IN SPACE (SLED EXPERIMENTS)

NSSDC ID- SPALAB1-41 INVESTIGATIVE PROGRAM
CODE SB/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
 PI - R. VON BAUMGARTEN U OF MAINZ
 OI - J. DICHGANS U OF FREIBURG
 OI - T. BRANDT KRUPP KRANKEN-ANGSTALN
 OI - H. SCHERER U OF MUNICH

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO USE THE SLED TO STUDY THE VISUO-VESTIBULAR COORDINATION AND THE INTEGRATION OF MULTISENSORY STIMULI WITHIN THE ORIENTATION CENTERS OF THE BRAIN BY SUBJECTING THE SUBJECT TO SHORT PERIODS OF LINEAR ACCELERATION IN CONJUNCTION WITH OPTOKINETIC STIMULATION AND CALORIC STIMULATION. IN ADDITION TO THE SPACE SLED, THE EQUIPMENT CONTAINS AN OPTOKINETIC STIMULATION DISPLAY, A CALORIC STIMULATION SYSTEM, AN OPTICAL TARGET SETTING SYSTEM, AN EYE MOVEMENT RECORDER, AN ELECTROMYOGRAPHIC RECORDING SYSTEM, AN ELECTRONYSTAGMOGRAPHIC RECORDING SYSTEM, ELECTROCARDIOGRAPHIC RECORDING SYSTEM, AND A MOTION PERCEPTION INDICATOR.

----- SPACELAB 1, VOSS, JR.-----

INVESTIGATION NAME- EFFECTS OF PROLONGED WEIGHTLESSNESS ON THE HUMORAL IMMUNE RESPONSE IN HUMANS

NSSDC ID- SPALAB1-17 INVESTIGATIVE PROGRAM
 CODE SB/CO-OP

INVESTIGATION DISCIPLINE(S)
 SPACE BIOLOGY

PERSONNEL
 PI - E.W. VOSS, JR. U OF ILLINOIS

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE AN EVALUATION OF PROLONGED WEIGHTLESSNESS AS A STRESS FACTOR EFFECT ON THE IMMUNE RESPONSE OF HUMANS, AND TO ESTABLISH THE CAPABILITY OF HUMANS TO RESPOND IMMUNOLOGICALLY TO POTENTIAL FOREIGN PATHOGENS DURING FUTURE SUSTAINED SPACE FLIGHT. THE EQUIPMENT INCLUDES A CONTAINER FOR STORING BLOOD SAMPLES, STERILE SYRINGES, NEEDLES, AND TEST TUBES.

----- SPACELAB 1, WILHELM-----

INVESTIGATION NAME- STUDY OF LOW-ENERGY ELECTRON FLUX AND ITS REACTION TO ACTIVE EXPERIMENTATION

NSSDC ID- SPALAB1-24 INVESTIGATIVE PROGRAM
 CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS

PERSONNEL
 PI - K. WILHELM MPI-AERONOMY
 OI - W. STUDEMANN MPI-AERONOMY
 OI - W. RIEDLER TECH U OF GRAZ

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE TO FLY A 2-PI FIELD OF VIEW ELECTROSTATIC ANALYZER TO MEASURE NATURAL ELECTRON FLUXES IN THE 0.5- TO 12.0-KEV RANGE TO STUDY PRECIPITATION PROCESS IN AURORAL EMISSION, EFFECTS OF THE ELECTRON ACCELERATOR (SEPAC) OPERATIONS ON THE NATURAL ELECTRON FLUXES, THE INFLUENCE OF THE SHUTTLE/SPACELAB GENERATED ATMOSPHERE ON THE NATURAL ELECTRON FLUX, AND TO STUDY NATURAL ELECTRON FLUXES AS A SENSITIVE PROBE OF THE SURFACE CHARGE ON THE STS/SPACELAB. THE EQUIPMENT CONSISTS OF AN ELECTROSTATIC DEFLECTION DEVICE WITH A HEMISPHERIC FIELD OF VIEW AND WITH AZIMUTH AND PITCH-ANGLE RESOLUTION, AND EIGHT CONTINUOUS-CHANNEL ELECTRON MULTIPLIERS FOR DETECTORS.

----- SPACELAB 1, WILLSON-----

INVESTIGATION NAME- ACTIVE CAVITY RADIOMETER SOLAR IRRADIANCE MONITOR

NSSDC ID- SPALAB1-04 INVESTIGATIVE PROGRAM
 CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
 SOLAR PHYSICS
 PARTICLES AND FIELDS

PERSONNEL
 PI - R.C. WILLSON NASA-JPL
 OI - R. BEER NASA-JPL
 OI - H. ZIRIN CALIF INST OF TECH
 OI - J. KENDALL, SR. CALIF INST OF TECH

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE TO MEASURE THE TOTAL SOLAR IRRADIANCE, TO MEASURE THE MAGNITUDE AND DIRECTION CHANGES IN THE TOTAL SOLAR IRRADIANCE, AND PROVIDE LONG-TERM CORRELATION AND CALIBRATION WITH SATELLITE ROCKET AND FUTURE SHUTTLE FLIGHTS. THE EQUIPMENT CONSISTS OF AN ACTIVE CAVITY RADIOMETER TYPE IV (SELF-CALIBRATING PYROHELIOMETER), A POWER CONVERTER, AN ELECTRONIC UNIT, AND SUPPORT STRUCTURE.

----- SPACELAB 1, YOUNG-----

INVESTIGATION NAME- VESTIBULAR STUDIES

NSSDC ID- SPALAB1-13 INVESTIGATIVE PROGRAM
 CODE SB/CO-OP

INVESTIGATION DISCIPLINE(S)
 SPACE BIOLOGY

PERSONNEL
 PI - L.R. YOUNG MASS INST OF TECH
 OI - G.M. JONES MCGILL U
 OI - R.E. MALCOLM D+C INST OF ENVIRN MED
 OI - K.E. MONEY D+C INST OF ENVIRN MED
 OI - C.M. OMAN MASS INST OF TECH

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO DETERMINE IF OTOLITH SENSITIVITY CHANGES ARE INVOLVED IN SPACE MOTION SICKNESS AND POSTFLIGHT POSTURAL DISTURBANCES. EQUIPMENT CONSISTS OF -- SLED FACILITY, MOTOR-DRIVEN ROTATING FIELD, 16-MM MOVIE CAMERA, CALIBRATION LIGHT ARRAY, STATION FOR HOPPING TEST, AND TAPE RECORDER.

***** SPACELAB 2*****

SPACECRAFT COMMON NAME- SPACELAB 2
 ALTERNATE NAMES-

NSSDC ID- SPALAB2

LAUNCH DATE- 01/22/82 WEIGHT- 14500. KG
 LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
 LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
 UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC
 ORBIT PERIOD- 93.3 MIN INCLINATION- 50. DEG
 PERIAPSIS- 400. KM ALT APOAPSIS- 400. KM ALT

PERSONNEL
 MM - R.E. PACE NASA-MSFC
 MS - E.W. URBAN NASA-MSFC
 MG - W.R. WITT NASA HEADQUARTERS
 SC - E. WEILER NASA HEADQUARTERS
 PM - D.C. JEAN NASA-MSFC

BRIEF DESCRIPTION

SPACELAB 2 CONSISTS OF THREE PALLETS AND A UNIQUE STRUCTURE (CALLED THE IGL00) ON WHICH VARIOUS INSTRUMENTS ARE EXPOSED TO THE SPACE ENVIRONMENT. INCLUDED IN THE PAYLOAD IS THE INSTRUMENT POINTING SYSTEM (IPS) BUILT BY THE EUROPEAN SPACE AGENCY (ESA) AND DESIGNED TO POINT THE INSTRUMENTS AT TARGETS OF OPPORTUNITY. THE FOLLOWING INVESTIGATIONS HAVE BEEN CHOSEN TO FLY ON THIS MISSION: VITAMIN D METABOLITES AND BONE DEMINERALIZATION, INTERACTION OF OXYGEN AND GRAVITY-INFLUENCED LIGNIFICATION, EJECTABLE PLASMA DIAGNOSTICS PACKAGE, PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDIES, SMALL HELIUM-COOLED INFRARED TELESCOPE, ELEMENTAL COMPOSITION AND ENERGY SPECTRA OF COSMIC RAY NUCLEI BETWEEN 50 GEV PER NUCLEON AND SEVERAL TEV PER NUCLEON, HARD X-RAY IMAGING OF CLUSTERS OF GALAXIES AND OTHER EXTENDED X-RAY SOURCES, SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM, CORONAL HELIUM ABUNDANCE SPACELAB EXPERIMENT (CHASE), HIGH-RESOLUTION TELESCOPE AND SPECTROGRAPH (HRTS), SOLAR UV SPECTRAL IRRADIANCE MONITOR (SUSIM), IN-ORBIT CALIBRATION OF MESA LOW-GRAVITY ACCELEROMETER, AND PROPERTIES OF SUPERFLUID HELIUM IN ZERO GRAVITY.

----- SPACELAB 2, BRUECKNER-----

INVESTIGATION NAME- SOLAR UV HIGH-RESOLUTION TELESCOPE AND SPECTROGRAPH (HRTS)

NSSDC ID- SPALAB2-10 INVESTIGATIVE PROGRAM
 CODE ST

INVESTIGATION DISCIPLINE(S)
 SOLAR PHYSICS

PERSONNEL
 PI - G.E. BRUECKNER US NAVAL RESEARCH LAB
 OI - J.D.F. BARTOE US NAVAL RESEARCH LAB
 OI - O.K. MOE US NAVAL RESEARCH LAB
 OI - K.R. NICOLAS US NAVAL RESEARCH LAB
 OI - M.E. VAN HOOSIER US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE: (1) THE STUDY OF THE ENERGY TRANSPORT AND MASS BALANCE OF THE TEMPERATURE MINIMUM, CHROMOSPHERE, TRANSITION ZONE AND CORONA IN THE QUIET SUN AS WELL AS IN PLAGES, FLARES, AND SUNSPOTS; (2) THE EXAMINATION OF THE VELOCITY FIELD OF THE LOWER CORONA TO STUDY THE ORIGIN OF THE SOLAR WIND; (3) THE STUDY OF THE STRUCTURE AND DYNAMICS OF SPICULES AND SUPERSPICULES IN THE UV SPECTRUM; (4) THE STUDY OF STRUCTURE AND DYNAMICS OF PROMINENCES; AND (5) THE STUDY OF PRE-FLARE AND FLARE PHENOMENA. THESE OBJECTIVES ARE OBTAINED THROUGH INTENSITY MEASUREMENTS, DOPPLER MEASUREMENTS, AND LINE PROFILE ANALYSIS OF HIGH SPATIAL

RESOLUTION (1 ARC-S) AND HIGH SPECTRAL RESOLUTION (0.05 Å) OF UV SPECTRA (WAVELENGTHS 1176-1700 Å) COVERING A WIDE VARIETY OF CONTINUA AND EMISSION LINES THAT ORIGINATE IN DIFFERENT TEMPERATURE REGIMES OF THE SOLAR ATMOSPHERE. THE INSTRUMENTATION CONSISTS OF A STIGMATIC SPECTROGRAPH WITH A SLIT THAT COVERS THE FULL SOLAR RADIUS SIMULTANEOUSLY WITH 1000 RESOLUTION ELEMENTS. THUS THE SLIT COVERS MANY DIFFERENT SOLAR FEATURES AT THE SAME TIME. ONE SPECTRUM CONTAINS ENOUGH INFORMATION FOR A STATISTICAL ANALYSIS. PHOTOGRAPHS OF A SERIES OF SPECTRA OVER A PERIOD OF AT LEAST 15 MIN ARE MADE IN ORDER TO FOLLOW THE CHANGES IN THE INTENSITY, DOPPLER VELOCITIES, AND LINE PROFILES AS THEY ARE CAUSED BY DISTURBANCES MOVING THROUGH THE SOLAR ATMOSPHERE. SPECTROHELIOGRAMS OF TWO DIMENSIONS AS A FUNCTION OF TIME ARE CONSTRUCTED IN ORDER TO INVESTIGATE THE 3-DIMENSIONAL STRUCTURE OF THE CHROMOSPHERE AND TRANSITION ZONE. A SYSTEMATIC MAPPING OF THE CORONAL VELOCITY FIELD OVER THE WHOLE SUN IS ALSO MADE ALONG WITH A SERIES OF LIMB SPECTRA AT DIFFERENT ALTITUDES FOR STUDIES OF STRUCTURE AND DYNAMICS OF SPICULES. THE SLIT IS POINTED WITHIN A TOLERANCE OF HALF A SLIT WIDTH FOR A DURATION OF AT LEAST 15 MIN. THE SLIT OF THE HIGH RESOLUTION TELESCOPE AND SPECTROGRAPH (HRTS) IS STEPPED IN RAPID SEQUENCE OVER A SMALL AREA OF THE SUN (PLUS OR MINUS 5 ARC-S), WHICH ALLOWS THE SPECTROHELIOGRAMS TO BE MADE. THE HRTS CONSISTS OF A 30-CM GREGORIAN TELESCOPE OF 90-CM FOCAL LENGTH, A UV SPECTROGRAPH, A 1600-Å BROAD-BAND SPECTROHELIOGRAPH, AND AN H ALPHA SPLIT DISPLAY SYSTEM HOUSED IN A THERMAL CONTROL CANISTER MOUNTED ON THE INSTRUMENT POINTING SYSTEM (IPS). THE TELESCOPE HAS AN OCCULTING MIRROR AT THE PRIMARY FOCUS THAT REFLECTS AWAY ALL BUT A 5 X 15 ARC-MIN PORTION OF THE SOLAR IMAGE THAT THEN PASSES THROUGH AN APERTURE TO STRIKE A SECONDARY MIRROR THAT RE-IMAGES IT ONTO THE UV WADSWORTH SPECTROGRAPHIC SLIT PLATE. THE SECONDARY MIRROR RECEIVES LESS THAN ONE SOLAR CONSTANT OF ILLUMINATION. THE SPECTRAL RESOLUTION IS 50 MILLIANGSTROMS AND THE SPATIAL RESOLUTION IS 1 ARC-S. THE ROLL FILM CAMERA HOLDS 1000 EXPOSURES OF TYPE 101 FILM. TV TRANSMISSION IS AT 4.2 MHZ. INSTRUMENT WEIGHS 185 KG AND USES 100 W AT 28 VDC (AVERAGE).

----- SPACELAB 2, BRUECKNER-----

INVESTIGATION NAME- SOLAR UV SPECTRAL IRRADIANCE MONITOR (SUSIM)

NSSDC ID- SPALAB2-11 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - G.E. BRUECKNER	US NAVAL RESEARCH LAB
OI - J.D.F. BARTOE	US NAVAL RESEARCH LAB
OI - D.K. PRINZ	US NAVAL RESEARCH LAB
OI - M.E. VAN HOOSIER	US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO: (1) IMPROVE THE ACCURACY OF KNOWLEDGE OF THE ABSOLUTE SOLAR FLUXES; (2) TO PROVIDE A HIGHLY ACCURATE TRACEABILITY OF SOLAR FLUXES TO A VARIETY OF UV RADIATION STANDARDS TO ESTABLISH LONG-TERM (SOLAR CYCLE) VARIATIONS; AND (3) TO MEASURE THE VARIABILITY OF SOLAR FLUXES IN THE WAVELENGTH RANGE OF 120-400 NANOMETERS DURING SEVERAL TIME PERIODS, RANGING FROM FLARE-PRODUCED CHANGES TO THE VARIABILITY FROM SOLAR ROTATION. IT IS DESIRED TO (A) IMPROVE THE ABSOLUTE ACCURACY OF SOLAR CONTINUUM IRRADIANCE MEASUREMENTS IN THIS WAVELENGTH RANGE WITH A GOAL OF PLUS OR MINUS 6 TO 10 PERCENT (WAVELENGTH-DEPENDENT), (B) MEASURE WITH HIGH ACCURACY THE INTENSITIES OF THE CONTINUUM BELOW 208 NANOMETERS RELATIVE TO THE INTENSITIES OF THE CONTINUUM ABOVE 208 NANOMETERS WITH A GOAL OF PLUS OR MINUS 1 PERCENT, (C) PERFORM HIGH ACCURACY MEASUREMENTS OF THE INTENSITIES OF SOLAR EMISSION LINES RELATIVE TO THE STABLE SOLAR CONTINUUM ABOVE 208 NANOMETERS WITH A GOAL OF PLUS OR MINUS 1 TO 5 PERCENT (WAVELENGTH-DEPENDENT), AND (D) IMPROVE THE ABSOLUTE ACCURACY OF SOLAR EMISSION LINE IRRADIANCE MEASUREMENTS IN THE 120- TO 400-NANOMETER REGION WITH A GOAL OF PLUS OR MINUS 6 TO 10 PERCENT (WAVELENGTH-DEPENDENT). EXISTING CALIBRATION METHODS WERE IMPROVED. A NEW ENVIRONMENTAL CONTROL SCHEME WAS DEvised, AND AN ELABORATE COMBINATION OF IN-FLIGHT CALIBRATION AND REDUNDANT MEASURING METHODS ARE USED IN ORDER TO DISTINGUISH INSTRUMENT CHANGES FROM TRUE SOLAR FLUX VARIATIONS. THE INSTRUMENTATION CONSISTS OF A SOLAR UV SPECTRAL IRRADIANCE MONITOR. THE MONITOR CONSISTS OF TWO IDENTICAL DOUBLE-DISPERSION SCANNING SPECTROMETERS, SEVEN DETECTORS (FIVE PHOTODIODES AND TWO PHOTON COUNTERS), AND A UV CALIBRATION LIGHT SOURCE. THEY ARE SEALED IN A CANISTER FILLED WITH 1.1 ATM OF ARGON TO ELIMINATE THE EFFECTS OF CONTAMINATION FROM HIGH VACUUM OUTGASING. ONE SPECTROMETER IS USED ALMOST CONTINUOUSLY DURING THE DAYLIGHT PORTION OF THE SOLAR-POINTED ORBIT FOR MEASURING SHORT-TIME VARIATIONS OF THE UV SOLAR FLUX (FLARE-RELATED AND SLOWLY-VARYING COMPONENT). THE OTHER SPECTROMETER IS USED ONLY ONCE A DAY TO TRACK ANY CHANGE IN SENSITIVITY OF THE FIRST SPECTROMETER. TWO OF THE FIVE PHOTODIODES ARE USED ONLY ONCE A DAY. A DEUTERIUM LAMP CALIBRATED IN SPECTRAL IRRADIANCE IS USED AS THE TRANSFER STANDARD SOURCE FOR DAILY IN-FLIGHT CALIBRATION AND STABILITY TRACKING OF BOTH SPECTROMETERS AND ALL SEVEN DETECTORS. THE TWO PHOTON COUNTERS OBTAIN A SPECTRAL RESOLUTION OF 0.1 NANOMETERS OVER THE WHOLE WAVELENGTH RANGE, WHILE 5-NANOMETER RESOLUTION IS OBTAINED WITH THE FIVE PHOTODIODES. A MICROPROCESSOR CONTROLS ALL INSTRUMENT FUNCTIONS BY PROGRAM INSTRUCTION. CHANNELS MONITOR THE 121.6-NANOMETER LINE (H ALPHA) AND SEVEN SEGMENTS OF THE CONTINUUM FROM 145 TO 390

NANOMETERS. EIGHT NARROW-BAND CHANNELS (0.1-NANOMETER RESOLUTION) ARE MONITORED CONTINUOUSLY AND SCANNED IN FIVE 0.1-NANOMETER STEPS. IN THE SPECTRAL SCAN MODE (ONCE A DAY) THE SPECTRUM FROM 120 TO 400 NANOMETERS IS SCANNED AT 0.1-NANOMETER RESOLUTION. IN THE NARROW-BAND MODE THE SOLAR SPECTRUM AND THE DEUTERIUM LAMP ARE SCANNED WITH BOTH SPECTROMETERS; BOTH ARE MONITORED IN THE BROAD-BAND MODE. INSTRUMENT WEIGHS 11 KG AND USES 14 W AT 28 VDC (AVERAGE).

----- SPACELAB 2, COWLES-----

INVESTIGATION NAME- INTERACTION OF OXYGEN AND GRAVITY INFLUENCED LIGNIFICATION

NSSDC ID- SPALAB2-02 INVESTIGATIVE PROGRAM
CODE SB

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL

PI - J.R. COWLES	U OF HOUSTON
OI - H.W. SCHELD	U OF HOUSTON

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO ESTABLISH THE EFFECT OF OXYGEN ON LIGNIN FORMATION IN PLANT TISSUE SUBJECTED TO A WEIGHTLESS ENVIRONMENT AND TO MEASURE THE RELATIVE AMOUNT OF AROMATIC BIOSYNTHESIS UNDER DIFFERENT OXYGEN ENVIRONMENTS. THE INVESTIGATION DISTINGUISHES BETWEEN TWO KNOWN FACTORS, OXYGEN AND GRAVITY, THAT INFLUENCE LIGNIFICATION IN PLANTS. SELECTED PREGERMINATED SEEDS ARE PLANTED IN METABOLIC CHAMBERS AND GERMINATED JUST PRIOR TO LAUNCH. CHAMBERS ARE CLOSED AND THE ATMOSPHERIC COMPOSITION IS ADJUSTED BY FLUSHING KNOWN GAS MIXTURES THROUGH RUBBER SEPTAS IN THE CHAMBER WALLS. THE O₂ CONCENTRATIONS ARE 21 PERCENT (FOR THE CONTROL), 10 PERCENT, AND 3 PERCENT. EACH OXYGEN CONCENTRATION IS DUPLICATED IN ANOTHER CHAMBER MODULE. MERCURY VAPOR LAMPS ARE USED TO SIMULATE SUNLIGHT DURING PROGRAMMED DAY/NIGHT CYCLES THROUGHOUT THE MISSION. THE INVESTIGATION IS ALSO DUPLICATED ON EARTH AT 1 GRAVITY AND ON A CLINOSTAT (GROUND CONTROLS). THE INVESTIGATION CHAMBER IS 51 X 36 X 27 CM, HAS A MASS OF 25 KG, AND IS STORED ON THE ORBITER MID-DECK. IT REQUIRES 55 W AND 28 V OF DC CURRENT TO OPERATE AND EXPENDS A TOTAL ENERGY OF 12 KWH.

----- SPACELAB 2, FAZIO-----

INVESTIGATION NAME- SMALL, HELIUM-COOLED INFRARED TELESCOPE

NSSDC ID- SPALAB2-05 INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
DUST
ZODIACAL LIGHT
ASTRONOMY

PERSONNEL

PI - G.G. FAZIO	SAO
OI - W.F. HOFFMANN	U OF ARIZONA
OI - D.E. KLEINMANN	SAO
OI - F.J. LOW	U OF ARIZONA
OI - G.H. RIEKE	U OF ARIZONA
OI - W.A. TRAUB	SAO
OI - E.W. URBAN	NASA-MSFC

BRIEF DESCRIPTION

THIS MULTIDISCIPLINARY INVESTIGATION INVOLVES BOTH SCIENTIFIC AND TECHNICAL GOALS. THE SCIENTIFIC OBJECTIVES ARE THE: (1) MEASUREMENT AND MAPPING OF EXTENDED LOW-SURFACE BRIGHTNESS INFRARED EMISSION FROM THE GALAXY. THE SENSITIVITY IS 500 TIMES MORE SENSITIVE THAN CURRENT BALLOON EXPERIMENTS AT 500 MICROMETERS, THUS MAKING POSSIBLE EXTENSIVE MEASUREMENT OF QUANTITY, DISTRIBUTION AND TEMPERATURES OF GALACTIC DUST AND STRUCTURE; (2) MEASUREMENT OF DIFFUSE EMISSION FROM INTERGALACTIC MATERIAL AND/OR GALAXIES AND QUASARS. THIS INVESTIGATION, COUPLED WITH THE INFRARED ASTRONOMY SATELLITE (IRAS) SELECTED CLUSTERS, PROVIDES NEW INFORMATION ON THE INTERGALACTIC MEDIUM; (3) MEASUREMENT OF THE ZODIACAL DUST EMISSION, ESPECIALLY IF THE DUST COLUMN DENSITY CAN BE HELD TO LESS THAN 1.E+12 MOLECULES/50 CM. THE SCANNING AND ABSOLUTE FLUX MEASUREMENT CAPABILITY MAKES IT POSSIBLE TO MEASURE THE ZODIACAL LIGHT EMISSION AND DISTINGUISH IT FROM OTHER SOURCES BY ITS SPECTRAL AND SPATIAL DISTRIBUTION; AND (4) MEASUREMENT OF A LARGE NUMBER OF DISCRETE INFRARED SOURCES THAT OVERLAP WITH THE IRAS RESULTS. SPATIAL FILTERING PROVIDES MEASUREMENTS OF THE FLUX, SPECTRAL CHARACTERISTICS, POSITIONS, AND SIZES OF DISCRETE SOURCES WITH HIGH SENSITIVITY. TECHNICAL OBJECTIVES CONCERNED WITH THE MEASUREMENT OF THE NATURAL AND SPACECRAFT-INDUCED INFRARED BACKGROUND AND THE DETERMINATION OF SUITABLE TECHNIQUES FOR THE IN-SPACE USE OF SUPERFLUID HELIUM AND CRYOGENIC TELESCOPES ARE: (1) TO TAKE ENVIRONMENTAL MEASUREMENTS OF: H₂O, CO₂ (AND OTHER INFRARED-ACTIVE MOLECULES), DUST PARTICLES, THE EFFECTS OF MOLECULAR DEPOSITION AND COSMIC RAYS, AND THE EFFECTS FROM THE SHUTTLE ENVIRONMENT ON THE PERFORMANCE OF COOLED INFRARED TELESCOPES; (2) TO PROVE OUT THE DESIGN OF COOLED INFRARED TELESCOPES; AND (3) TO DEMONSTRATE THE PERFORMANCE OF A LARGE SUPERFLUID HELIUM DEWAR SYSTEM AND MEASURE CERTAIN PROPERTIES OF IT IN SPACE. THE INSTRUMENTATION CONSISTS OF A SMALL HERSCHELIAN TELESCOPE (15 CM IN DIAMETER WITH AN F/4 OFF AXIS) COOLED TO 3 K. IT SCANS AT THE RATE OF 6 DEG/S AND COVERS A 90-DEG ARC ACROSS THE SKY. THE FOCAL PLANE CONTAINS 11 DETECTORS, 9 OF WHICH COVER THE

REGION FROM 4 TO 120 MICROMETERS IN THREE NON-OVERLAPPING BROADBANDS (4 TO 9, 12 TO 24, AND 50 TO 120 MICROMETERS). TWO DETECTORS HAVE NARROW-BAND RESPONSES AT THE H₂O AND CO₂ BAND LOCATIONS (6 TO 7 AND 14 TO 16 MICROMETERS). THEY COVER A FULL 3 DEG PERPENDICULAR TO THE SCAN DIRECTION. THERE IS ALSO A MOVEABLE COLD SHUTTER TO PROVIDE AN ABSOLUTE ZERO FLUX REFERENCE FOR EACH BAND. THE STORED LIQUID HELIUM COOLING SYSTEM IS COMPOSED OF A LIQUID HELIUM DEWAR CONTAINING LIQUID HELIUM AT 1.5 K, A TRANSFER LINE ASSEMBLY, A VAPOR-COOLED TELESCOPE CRYOSTAT, AND A CRYOSTAT VACUUM COVER. THE PALLET DIMENSIONS ARE 165 X 91 X 340 CM WITH A TOTAL MASS OF 690 KG. THE INSTRUMENTATION USES 125 W AND 28 V OF DC POWER AND THE TOTAL ENERGY EXPENDED IS 25 KWH. DATA ARE TRANSMITTED AT 614 KBS (MAXIMUM).

----- SPACELAB 2, GABRIEL-----

INVESTIGATION NAME- SOLAR CORONAL HELIUM ABUNDANCE

NSSDC ID- SPALAB2-09

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - A.H. GABRIEL
PI - J.L. CULHANE
OI - B.E. PATCHETT
OI - K. STRONG

APPLETON LAB
U COLLEGE LONDON
APPLETON LAB
U COLLEGE LONDON

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO: (1) DETERMINE THE RELATIVE ABUNDANCE OF HELIUM TO HYDROGEN IN THE SOLAR CORONA FROM THE MEASUREMENT OF THE PHOTOEXCITATION OF HYDROGEN LYMAN ALPHA 1216 Å AND HELIUM II AT 304 Å; (2) DETERMINE THE FUNDAMENTAL PARAMETERS OF THE CORONAL PLASMA SUCH AS ELECTRON DENSITY, TEMPERATURE, AND IONIZATION BALANCE AS A FUNCTION OF RADIAL DISTANCE ABOVE THE LIMB. THESE MAY DETERMINE THE ONSET OF THE SOLAR WIND; AND THE REASONS FOR THE LARGE VARIATIONS IN THE RELATIVE ABUNDANCE OF HELIUM IN THE SOLAR WIND DETECTED NEAR EARTH; (3) CONSTRUCT A CONTOUR MAP IN THE INTENSITY OF SELECTED EXTREME UV LINES AND IN PHYSICAL PARAMETERS (ELECTRON TEMPERATURE AND DENSITY) OF CORONAL FEATURES WITH 15 ARC-S RESOLUTION BOTH ON THE DISK AND ABOVE THE LIMB OF THE SUN. THESE GIVE INFORMATION ON THE STRUCTURE OF CORONAL FEATURES SUCH AS ACTIVE REGIONS, CORONAL STREAMERS, AND HELMET STREAMERS; AND (4) MONITOR THE UV INTENSITY OF SHORT-TERM VARIABLE STARS AND DETERMINE THE LINE AND CONTINUUM INTENSITIES FOR A VARIETY OF SPECTRAL TYPES. FOR COOL STARS THIS INVOLVES CHROMOSPHERIC ACTIVITY AND FOR HOT STARS THE EUV FLUX LEVELS. THE INSTRUMENTATION IS COMPOSED OF A 1-M GRAZING-INCIDENCE SPECTROMETER USING A 1200-LINE/MM RULED GRATING. THE SUN'S IMAGE IS FOCUSED ONTO THE ENTRANCE SLIT PLANE BY MEANS OF A 28-CM FOCAL LENGTH GRAZING-INCIDENCE TELESCOPE OF WOLTER TYPE I SECTOR DESIGN. THE SLIT IS ORIENTED TANGENTIALLY TO THE SOLAR LIMB AND CAN BE STEPPED RADIALY IN STEPS OF 1 ARC-MIN FROM A POSITION ON THE SOLAR DISK TO 8 ARC-MIN ABOVE THE LIMB BY A SERVO-DRIVEN LINEAR TRAVERSE ON THE TELESCOPE MIRROR. TEN TO 14 ELECTRON MULTIPLIERS ARE POSITIONED BEHIND DIFFERENT EXIT SLITS AT PRE-SELECTED SPECTRAL POSITIONS ON THE ROWLAND CIRCLE. TWO POSITIONS ARE AT 1216 Å AND 304 Å (FOR H/HE ABUNDANCES). THE OTHER SLITS COVER OTHER SUBSIDIARY REQUIREMENTS SUCH AS STRAY LIGHT EVALUATION. SOME SLITS HAVE ATTENUATING FILTERS FOR DYNAMIC RANGE OF THE RATIO OF THE DISK INTENSITY TO THAT OF THE CORONA AT 3.5-65 KM. FILTERS ARE REMOVED FOR LIMB MEASUREMENTS. A SMALL OSCILLATORY ROTATION OF THE GRATING ABOUT AN AXIS THROUGH THE ENTRANCE SLIT PERMITS A SMALL WAVELENGTH SCAN TO DISCRIMINATE AGAINST SCATTERED STRAY LIGHT. AN AUXILIARY INSTRUMENT MONITORS CHANGES IN THE 11 304-Å INTENSITY CAUSED BY ATMOSPHERIC ABSORPTION EFFECTS RESULTING FROM SPACECRAFT HEIGHT OR CHANGES OF LINE-OF-SIGHT TO THE SUN. A ZERO-ORDER DETECTOR MONITORS THE SOLAR LIMB CROSSINGS AND GIVES DATA ON SHORT-TERM INTENSITY VARIATIONS IN STARS FOR WAVELENGTHS SHORTER THAN 1400 Å. SIGNALS ARE COUNTED, MULTIPLEXED, AND INTERFACED WITH THE SPACELAB TELEMETRY SYSTEM FOR TRANSMISSION TO THE GROUND. THE DATA RATE IS 8.2 KBS. THE DIMENSIONS OF THE INSTRUMENT ARE 70 X 70 X 140 CM. THE ELECTRONICS ARE 30 X 30 X 30 CM, AND THE TOTAL MASS IS 160 KG. THE AVERAGE POWER IS 80 W, 28 V DC AND THE TOTAL ENERGY IS 8.9 KWH. THE POINTING ACCURACY IS 15 ARC-S AND THE POINTING STABILITY IS 5 ARC-S.

----- SPACELAB 2, LANGE-----

INVESTIGATION NAME- IN-ORBIT CALIBRATION OF LOW-G MINIATURE ELECTROSTATIC ACCELEROMETER

NSSDC ID- SPALAB2-12

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
TECHNOLOGY

PERSONNEL

PI - W.G. LANGE

BELL AEROSPACE CORP

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE THE: (1) EVALUATION OF THE SPACELAB 2 ORBITAL LOW-GRAVITY ACCELERATION ENVIRONMENT IN PLANNED MODES OF OPERATION, (2) EVALUATION OF THE SPACELAB 2 CAPABILITY AS A LOW-GRAVITY TEST FACILITY, AND (3) CALIBRATION AND EVALUATION OF THE IN-ORBIT PERFORMANCE OF THE MINIATURE ELECTROSTATIC ACCELEROMETER (KESA) AS MODIFIED FOR 3-AXIS ACCELERATION MEASUREMENT CAPABILITY. THE INSTRUMENTATION CONSISTS OF A 3-AXIS MINIATURE ELECTROSTATIC ACCELEROMETER MOUNTED ON A ROTATING TABLE THAT INTRODUCES A VARIABLE AND CONTROLLABLE CENTRIPETAL ACCELERATION ALONG THE INPUT AXIS. THE TABLE ALSO PROVIDES MODULATION OF THE SENSED ACCELERATIONS, SHIFTING THE SIGNAL TO A LOW-NOISE REGION OF THE POWER DENSITY SPECTRUM. ONE OR MORE FIXED POSITIONS ARE USED TO MEASURE ALONG PREFERRED AXES. CALIBRATION REQUIRES THAT A KNOWN ACCELERATION BE INTRODUCED ALONG ITS INPUT AXIS. THIS CAN BE ACCOMPLISHED BY GRAVITY GRADIENT, MASS ATTRACTION, OR A SLOWLY ROTATING TABLE. THE LATTER IS USED BECAUSE IT HAS A LARGE NUMBER OF DIFFERENT ACCELERATION LEVELS THAT CAN BE PRODUCED BY VARYING THE ROTATION SPEED. VEHICLE ANGULAR RATES AND ORBITAL DRAG ARE FREQUENTLY MODULATED. OPERATING MODES INCLUDE A CALIBRATION MODE, A TABLE-ROTATING MODE, AND A TABLE-FIXED MODE. THE MEASUREMENT PERIOD FOR ROTATION RATES USED VARIES FROM 10 S AT 1.E-4 GRAVITY TO 1000 S AT 1.E-8 GRAVITY. THE ACCELEROMETER TABLE ASSEMBLY IS 25 X 16 CM AND THE ELECTRONICS IS 21 X 13 X 9 CM. THE TOTAL ENERGY USED IS 3.8 KWH, AND THE INSTRUMENT WEIGHS 7 KG.

----- SPACELAB 2, MASON-----

INVESTIGATION NAME- DYNAMICS AND THERMAL PROPERTIES OF SUPERFLUID HELIUM IN ZERO-G

NSSDC ID- SPALAB2-13

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - P.V. MASON
OI - D.J. COLLINS
OI - D.D. ELLEMAN
OI - D. PETRAC
OI - M.M. SAFFREN
OI - T.G. WANG

NASA-JPL
NASA-JPL
NASA-JPL
NASA-JPL
NASA-JPL
NASA-JPL

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO DETERMINE THE FLUID AND THERMAL PROPERTIES REQUIRED FOR THE DESIGN OF PLANNED SPACE EXPERIMENTS USING SUPERFLUID HELIUM (2.2 K) AS A CRYOGEN, TO ADVANCE SCIENTIFIC UNDERSTANDING OF THE INTERACTIONS BETWEEN SUPERFLUID AND NORMAL LIQUID HELIUM, AND TO DEMONSTRATE THE USE OF SUPERFLUID HELIUM AS A CRYOGEN IN ZERO GRAVITY. SPECIFICALLY, THE OBJECTIVES ARE TO: (1) TAKE DETAILED MEASUREMENTS OF LOW-FREQUENCY SLOSH MODES OF SUPERFLUID HELIUM. THE SLOSHING AMPLITUDES, FREQUENCIES, AND DAMPING MUST BE KNOWN FOR FUTURE EXPERIMENT DESIGN; (2) TAKE PRECISE MEASUREMENTS OF THE THERMAL FLUCTUATIONS AND DISTRIBUTIONS IN SUPERFLUID HELIUM IN ZERO GRAVITY. ZERO GRAVITY MAY INDUCE NONUNIFORMITIES THAT ARE NOT OBSERVED IN TERRESTRIAL LABS AT 1 GRAVITY. QUANTITATIVE MEASUREMENTS OF SPATIAL DISTRIBUTIONS AND THE SPECTRUM OF TEMPORAL FLUCTUATIONS ARE REQUIRED BY DESIGNERS OF FUTURE INVESTIGATIONS. THE INVESTIGATION PERFORMS AT THE MICROKELVIN LEVEL OVER A FREQUENCY RANGE FROM 0-100 HZ; (3) DEVELOP AN APPARATUS TO MEASURE THE VELOCITIES AND ATTENUATION OF QUANTIZED SURFACE WAVES IN SUPERFLUID FILMS IN FREQUENCIES SO HIGH THAT SURFACE TENSION FORCES DOMINATE OVER GRAVITY FORCES AND ATTENUATION EFFECTS ON EARTH PRECLUDE THEIR MEASUREMENT; AND (4) OBTAIN SUPERFLUID HELIUM CRYOSTAT PERFORMANCE DATA FOR FUTURE SPACE APPLICATIONS BY MEASURING TEMPERATURE DISTRIBUTIONS AND THE SPECTRUM OF TEMPERATURE FLUCTUATIONS WITHIN THE MAIN HELIUM DEWAR AND PRESSURES IN VENT CONTROL LINES. THE INSTRUMENTATION CONSISTS OF AN INSTRUMENTED CRYOSTAT (CONTAINING AN INVESTIGATION PACKAGE INSIDE) AND A SUPPORT ELECTRONICS PACKAGE. THE CAVITY IS SURROUNDED BY A 90-LITER SUPERFLUID HELIUM TOROID AND A MULTILAYER SUPER INSULATION SYSTEM SPACED BY HELIUM VAPOR-COOLED SHIELDS. THE DEWAR OPERATES IN BOTH UPRIGHT AND HORIZONTAL CONFIGURATIONS. THE CRYOSTAT IS INSTRUMENTED WITH GERMANIUM AND THERMOCOUPLE TEMPERATURE SENSORS TO MONITOR THE CHAMBER TEMPERATURES AND THE SUPERFLUID PLUG AND INSULATION PERFORMANCE. ACCELEROMETERS MONITOR VIBRATION EFFECTS IN ORDER TO CROSS-CORRELATE WITH THE BULK BEHAVIOR OBSERVATIONS. THE APPARATUS TO MEASURE THERMAL AND FLUID DYNAMICS USES AN OPEN FRAME STRUCTURE TO POSITION UP TO 100 LIQUID-VAPOR PHASE SENSORS IN A 3-LITER VOLUME PARTIALLY FILLED WITH LIQUID HELIUM. THE FRAME ALSO HAS 25 SEMICONDUCTOR THERMOMETERS OF DIFFERING SENSITIVITY CAPABLE OF RESOLVING DIFFERENCES OF 10 MICROKELVINS AT FREQUENCIES UP TO 1 HZ. THE SPECTRUM OF TEMPERATURE FLUCTUATIONS IS MEASURED BY 9 CARBON-FILM DETECTORS OF 1-MICROKELVIN SENSITIVITY RESPONDING TO FREQUENCIES FROM DC TO 100 HZ. IN THE QUANTIZED SURFACE WAVE INVESTIGATION SUPERFLUID FILMS ARE CONTAINED IN POLISHED ANNULAR CHANNELS LOCATED IN SEVERAL SEALED CHAMBERS (EACH OF WHICH HAS A DIFFERENT FILM THICKNESS) IN THE SATURATED RANGE FROM 1 TO 10 MICROMETERS. A FILM HEATER IS PLACED IN EACH CHANNEL TO GENERATE CAPILLARY WAVES IN THE FILM WITH A PATH LENGTH OF $(2\pi)(R)(N)$ (R = THE RADIUS OF THE PATH, AND N = THE NUMBER OF TIMES THE PULSE CIRCULATES). MODERATELY ACCURATE ESTIMATES OF THE VELOCITY AND ATTENUATION OF QUANTIZED SURFACE WAVES IN THE CAPILLARY REGIME OF 1 TO 100 HZ IN THE FILMS OF 0.1- TO 1-MICROMETER THICKNESS ARE EXPECTED TO BE OBTAINED. THE CRYOSTAT IS 100 X 100 CM. THE PROCESSOR IS 45 X 17 X 23 CM AND THE VACUUM PUMP IS 30 X 30 X 45 CM. THE EXPERIMENT WEIGHT

IS 232 KG.

----- SPACELAB 2, MENDILLO-----

INVESTIGATION NAME- PLASMA DEPLETION EXPERIMENTS FOR
IONOSPHERIC AND RADIO ASTRONOMICAL STUDY

NSSDC ID- SPALAB2-04

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - M.	MENDILLO	BOSTON U
PI - A.V.	DA ROSA	STANFORD U
OI - M.D.	PAPAGIANNIS	BOSTON U
OI - M.	KELLEY	CORNELL U
OI - R.A.	HELLINELL	STANFORD U
OI - P.A.	BERNHARDT	STANFORD U
OI - M.B.	PONGRATZ	LOS ALAMOS SCI LAB
OI - G.M.	SMITH	LOS ALAMOS SCI LAB
OI - D.J.	BAKER	UTAH STATE U
OI - R.D.	HARRIS	UTAH STATE U
OI - D.T.	FARLEY	CORNELL U
OI - D.	ANDERSON	NOAA-SEL

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO: (1) STUDY THE IONOSPHERIC (F-REGION) DEPLETION AND RELATED EFFECTS CAUSED BY SHUTTLE THRUSTER FIRINGS IN BOTH HIGH AND LOW MID-LATITUDES, (2) DETERMINE THE NATURE OF THE PHYSICAL PROCESSES GOVERNING THE IONOSPHERIC STRUCTURE, INCLUDING DIFFUSION COEFFICIENTS, CHEMICAL REACTION RATES, NEUTRAL WIND VELOCITIES, ELECTRIC FIELDS, ELECTRON COOLING RATES, AND LIMITING FLUXES, (3) PRODUCE CONTROLLED PERTURBATIONS IN THE PLASMASPHERE TO EXAMINE THE FORMATION OF ARTIFICIAL VLF DUCTS AND THE EQUATORIAL SPREAD F, AND (4) USE THE IONOSPHERIC DEPLETION REGION (HOLE) TO CONDUCT GROUND-BASED HIGH-RESOLUTION RADIO ASTRONOMICAL STUDIES. DURING FLIGHT THRUST FIRINGS FROM THE ORBITAL MANEUVERING SYSTEM RELEASE A MINIMUM OF 200 KG OF EXHAUST VAPORS OVER EACH OF THE RADIO ASTRONOMICAL SITES OF WESTFORD, MA; PUERTO RICO; ROBERVAL, QUEBEC; JICAMARCA; PERU; AND HOBART, AUSTRALIA. AIRGLOW OBSERVATIONS ARE ATTEMPTED WITH A HIGH-RESOLUTION FABRY-PEROT INTERFEROMETER AT 6500 A CAPABLE OF DISCRIMINATING BETWEEN ATMOSPHERIC EMISSIONS AND SOLAR BACKGROUND RADIATION. RADAR AND OPTICAL MEANS ARE USED TO MEASURE TEMPERATURE FLUCTUATIONS AND ION DENSITY WHILE ELECTRON CONTENT MEASUREMENTS ARE MADE FROM SATELLITE SIGNALS PASSING THROUGH THE MODIFIED REGION. VLF PROPAGATION EFFECTS ARE EXAMINED BETWEEN ROBERVAL, QUEBEC AND SIPLE, ANTARCTICA TO MEASURE THE EFFECTS OF ARTIFICIALLY PRODUCED F-REGION GRADIENTS ON THE IONOSPHERIC PROPAGATION OF VLF SIGNALS. COLUMNAR ELECTRON CONTENT MEASUREMENTS ARE CONDUCTED USING POLARIMETERS IN CONJUNCTION WITH GEOSTATIONARY SATELLITE BEACONS. OPTICAL OBSERVATIONS PROVIDE INFORMATION ON LOW-LATITUDE NEUTRAL WIND VELOCITIES AND ELECTRIC FIELDS. LOW-FREQUENCY RADIO ASTRONOMY OBSERVATIONS MEASURE THE GALACTIC RADIO NOISE IN THE 1 TO 5 MHZ RANGE, WHERE THE PEAK OF GALACTIC EMISSION OCCURS, AND INTERESTING RADIO SOURCES, E.G. VELA AND GUM NEBULAE.

----- SPACELAB 2, MEYER-----

INVESTIGATION NAME- ELEMENTAL COMPOSITION AND ENERGY SPECTRA
OF COSMIC RAY NUCLEI

NSSDC ID- SPALAB2-06

INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS

PERSONNEL

PI - P.	MEYER	U OF CHICAGO
PI - D.	MUELLER	U OF CHICAGO
OI - J.E.	LAMPORT	U OF CHICAGO
OI - J.L.	HEUREUX	U OF CHICAGO

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO MAKE A PRECISE DETERMINATION OF THE CHARGE COMPOSITION AND INDIVIDUAL ENERGY SPECTRA OF COSMIC RAY NUCLEI FROM LITHIUM TO IRON COVERING THE ENERGY RANGE FROM 50 TO 2000 GEV/NUCLEON. THE INVESTIGATION EXPOSES TO DEEP SPACE AN INSTRUMENT OF LARGE VOLUME AND CONSIDERABLE MASS FOR AN EXTENDED TIME PERIOD WITHOUT THE INFLUENCE OF AN OVERLYING ATMOSPHERE. THE INSTRUMENT FOR CHARGE COMPOSITION IS A TELESCOPE OF TWO PLASTIC SCINTILLATORS; FOR THE ENERGY MEASUREMENTS TWO GAS CERENKOV COUNTERS COVERING THE RANGE FROM 50 TO 150 GEV/NUCLEON AND A TRANSITION RADIATION DETECTOR SYSTEM FOR THE REGION FROM 400 TO 2000 GEV/NUCLEON ARE USED. THE DETECTOR ELEMENTS ARE CONTAINED IN A CYLINDRICAL PRESSURIZED SHELL WITH HEMISPHERICAL TOP AND BOTTOM COVERS (2.8 M IN DIAMETER WITH A MAXIMUM HEIGHT OF 3.7 M). ALL DETECTOR ELEMENTS OCCUPY AREAS 2 X 2 M. THE TRANSITION RADIATION DETECTOR CONSISTS OF SIX RADIATORS (WITH A TOTAL OF 10,000 PLASTIC FOILS OF 5-MICROMETER THICKNESS) AND SIX XENON-FILLED MULTIWIRE PROPORTIONAL CHAMBERS AND IS POSITIONED IN THE CENTER OF THE INSTRUMENT. TWO SCINTILLATORS ARE ADJACENT TO BOTH ENDS AND ARE HOUSED IN LIGHT INTEGRATION BOXES. THE TWO GAS CERENKOV COUNTERS FILL THE REMAINING SPACE BETWEEN THE SCINTILLATORS AND HEMISPHERICAL LIDS OF THE PRESSURIZED CONTAINER. THEY ARE FILLED WITH GASES AT ATMOSPHERIC PRESSURE AND THE INNER WALLS ARE COATED WITH WHITE HIGHLY REFLECTIVE

PAINT. THERE IS A GEOMETRIC FACTOR OF 5 SQ M-SR FOR THE TRANSITION DETECTOR AND 1 SQ M-SR FOR THE CERENKOV COUNTER TELESCOPE. TO DETECT THE LIGHT OF AN INCIDENT PARTICLE, 24 PHOTOMULTIPLIER TUBES WITH PHOTOCATHODES 12.7 CM (5 IN.) IN DIAMETER ARE USED. FAST 5.08-CM (2-IN.) PHOTOMULTIPLIERS ARE COUPLED DIRECTLY TO THE SCINTILLATORS, WHICH ARE USED FOR TIME DELAYS BETWEEN RESPONSES RECORDED BY EACH SCINTILLATOR; PARTICLES MUST PENETRATE BOTH. CERENKOV RADIATION IS DETECTED BY 50 TUBES WITH 12.7-CM (5-IN.) WINDOWS. AN ELECTRONICS PACKAGE COLLECTS THE INFORMATION FROM THE VARIOUS SENSORS AND FORMATS IT FOR GROUND TRANSMISSION. DIMENSIONS OF THE DETECTOR ASSEMBLY PALLET ARE 280 X 280 X 370 CM WITH A TOTAL MASS OF 1784 KG. POWER IS 231 W AND 28 V OF DC CURRENT AND THE TOTAL ENERGY EXPENDED IS 44 KWH. THE DATA RATE IS 102 KBS.

----- SPACELAB 2, SCHNOES-----

INVESTIGATION NAME- VITAMIN D METABOLITES AND BONE
DEMINERALIZATION

NSSDC ID- SPALAB2-01

INVESTIGATIVE PROGRAM
CODE SB

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL

PI - H.K.	SCHNOES	U OF WISCONSIN
OI - H.F.	DE LUCA	U OF WISCONSIN
OI - E.	HOLTON	NASA-ARC

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO DETERMINE THE VITAMIN D METABOLITES AND BONE DEMINERALIZATION OCCURRING IN THE SPACELAB 2 CREW MEMBERS. ALL ANALYTICAL STEPS ARE PERFORMED IN THE INVESTIGATORS' TERRESTRIAL LABORATORY. BLOOD IS DRAWN FROM EACH CREW MEMBER (TWO SAMPLES PRIOR TO, TWO DURING, AND TWO AFTER THE MISSION). BLOOD IS HEPARINIZED AND PLASMA IS OBTAINED BY CENTRIFUGATION AND STORED AT -20 DEG C. INSTRUMENTATION CONSISTS OF TWO BLOOD COLLECTION KITS MEASURING 30 X 20 X 8 CM, A CENTRIFUGE 47 X 39 X 23 CM, AND A FREEZER 53 X 56 X 46 CM, ALL LOCATED IN THE ORBITER MID-DECK. THE TOTAL MASS OF THE INSTRUMENTATION IS 46 KG. IT REQUIRES 200 W AND 28 V OF DC POWER AND IT USES A TOTAL ENERGY OF 0.3 KWH.

----- SPACELAB 2, SHAWHAN-----

INVESTIGATION NAME- EJECTABLE PLASMA DIAGNOSTICS PACKAGE

NSSDC ID- SPALAB2-03

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - S.D.	SHAWHAN	U OF IOWA
OI - L.A.	FRANK	U OF IOWA
OI - D.A.	GURNETT	U OF IOWA
OI - N.	D'ANGELO	U OF IOWA
OI - H.C.	BRINTON	NASA-GSFC

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO MEASURE ELECTRIC FIELD WAVES AND THE PLASMA PARTICLE DISTRIBUTION FUNCTIONS RESULTING FROM THE STS (SPACE TRANSPORTATION SYSTEMS) OPERATING SYSTEMS, THE MOTION OF THE ORBITER THROUGH THE PLASMA, THE INJECTION OF ELECTRON BEAMS INTO THE PLASMA, AND THE UNPERTURBED MAGNETOSPHERE PHENOMENA. IT CONSISTS OF A FULLY INSTRUMENTED SUBSATELLITE SYSTEM WITH SENSORS TO MEASURE: ELECTRIC AND MAGNETIC FIELDS AND WAVES FROM 5 HZ TO 10 MHZ, PLASMA ION AND ELECTRON DISTRIBUTION FUNCTIONS FROM 2 EV TO 50 KEV, AND ELECTRON DENSITY AND TEMPERATURE. THE PLASMA DIAGNOSTIC PACKAGE (PDP) IS MOUNTED IN THE PALLET AREA ON A SPRING-DRIVEN EJECTION MECHANISM. THE REMOTE MANIPULATOR SYSTEM REMOVES THE PDP AND SCANS IT WITHIN THE ORBITER BAY TO SURVEY THE LOCALLY GENERATED FIELDS AND PLASMA. ONCE REPLACED ON THE EJECTION MECHANISM, THE PDP IS LAUNCHED TO CO-ORBIT WITH THE ORBITER AT RANGES UP TO 10 KM IN ORDER TO MEASURE NATURAL AND INDUCED WAVES, FIELDS, AND PLASMA IN THE ORBITER ENVIRONMENT. THE INSTRUMENTATION MEASURES 107 X 93 CM AND CONSISTS OF: (1) A QUADRISPHERICAL LOW-ENERGY PROTON AND ELECTRON DIFFERENTIAL ANALYZER, (2) PLASMA WAVE ANALYZER/ELECTRIC DIPOLE AND MAGNETIC SEARCH COIL SENSORS, (3) A DC ELECTRIC FIELD METER OPERATING IN THE RANGE OF 2 MILLIVOLTS/M TO 2000 MILLIVOLTS/M, (4) A TRIAXIAL FLUXGATE MAGNETOMETER, AND (5) A LANGMUIR PROBE TO MEASURE ELECTRON DENSITY IN THE REGION OF E+4 TO E+7 PER CUBIC CM, AND ELECTRON TEMPERATURE FROM 500 TO 5000 K. IN ADDITION, THE INVESTIGATION CONSISTS OF A SPECIAL-PURPOSE END EFFECTOR (81 X 35 CM), A LATCH MECHANISM ASSEMBLY (102 X 102 X 38 CM), A RECEIVER AND DATA PROCESSING ASSEMBLY, AND AN RF ANTENNA ASSEMBLY (27 X 33 X 61 CM). THE TOTAL MASS IS 395 KG, AND THE UNIT USES 50 W AND 28 V OF DC POWER FOR A TOTAL ENERGY OF 2.04 KWH. THE DATA ARE DIGITAL AT 337 KBS AND THE VIDEO OPERATES AT 4.2 MHZ. THE INVESTIGATION IS COORDINATED WITH SPALAB2-04 (PLASMA DEPLETION).

----- SPACELAB 2, TITLE-----

INVESTIGATION NAME- SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM

NSSDC ID- SPALAB2-08

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - A.M. TITLE	LOCKHEED PALO ALTO
O1 - H.E. RAMSEY	LOCKHEED PALO ALTO
O1 - R.C. SMITHSON	LOCKHEED PALO ALTO
O1 - S.A. SCHOOLMAN	LOCKHEED PALO ALTO
O1 - T.D. TARBELL	LOCKHEED PALO ALTO
O1 - L.W. ACTON	LOCKHEED PALO ALTO
O1 - W.C. LIVINGSTON	KITT PEAK NATL OBS
O1 - J.W. HARVEY	KITT PEAK NATL OBS
O1 - R.W. MILKEY	KITT PEAK NATL OBS
O1 - G.W. SIMON	SACRAMENTO PEAK OBS
O1 - S.P. WORDEN	SACRAMENTO PEAK OBS
O1 - J.B. ZIRKER	SACRAMENTO PEAK OBS

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO: (1) MEASURE MAGNETIC AND VELOCITY FIELDS IN THE SOLAR ATMOSPHERE WITH HIGH SPATIAL RESOLUTION (POSSIBLE BECAUSE THE INSTRUMENT IS ABOVE THE ATMOSPHERE) AND DEDUCE THE SMALL-SCALE STRUCTURE AND EVOLUTION OF THESE FIELDS ON THE 10-TO 20-MIN TIME SCALE OF SOLAR GRANULATION; (2) FOLLOW THE EVOLUTION OF SOLAR MAGNETIC STRUCTURES OVER PERIODS OF 20 TO 40 H IN ORDER TO DETERMINE HOW THE MAGNETIC ELEMENTS COUPLE TO THE SUPERGRANULE VELOCITY PATTERNS AND BY WHAT MECHANISMS FIELD DIFFUSION AND DISAPPEARANCE OCCUR; (3) STUDY WITH HIGH TEMPORAL AND SPATIAL RESOLUTION THE MAGNETIC FIELD CHANGES ASSOCIATED WITH TRANSIENT EVENTS SUCH AS FLARES AND TO ISOLATE AND FOLLOW THE BIRTH OF SUNSPOTS, PORES, AND EPHEMERAL REGIONS; (4) DEVELOP THE ELEMENTS OF AN H ALPHA MAGNETOGRAPH/TELESCOPE THAT CAN BE REFLOWN; AND (5) PROVIDE A TEST OF THE POINTING ACCURACY AND STABILITY OF THE INSTRUMENT POINTING SYSTEM (IPS) TO SUBARC-SECOND ACCURACY. THE INSTRUMENTATION CONSISTS OF A SOLAR OPTICAL UNIVERSAL POLARIMETER MOUNTED ON THE IPS. THE POLARIMETER IS COMPOSED OF A TUNABLE BIREFRIGENT FILTER WITH A BANDPASS OF 60 MILLIANGSTROMS USING ASSOCIATED BLOCKING FILTERS TO PERMIT THE FILTER TO OPERATE IN EIGHT SPECTRAL BANDS, EACH ABOUT 8 Å WIDE. A FILM CAMERA TAKES DIRECT FILTERGRAMS THROUGH THE TUNABLE FILTER. A CID-ARRAY CAMERA TAKES PHOTOELECTRIC FILTERGRAMS WITH A HIGH SIGNAL-TO-NOISE RATIO THROUGH THE TUNABLE FILTERS. A VIDEO PROCESSOR STORES IMAGES IN DIGITAL MEMORY AND A HIGH RESOLUTION WHITE LIGHT SYSTEM WITH FILM CAMERA AND VIDEO DISPLAY IS USED FOR ACQUISITION OF ACCURATE POINTING DATA. THE FILTER SYSTEMS ARE INTERFACED TO A 30-CM CASSEGRAIN TELESCOPE WITH OFFSET POINTING CAPABILITY. ROTATABLE WEDGES ARE PLACED IN FRONT OF THE TELESCOPE TO ALLOW IT TO OBSERVE ANY DESIRED POINT ON THE SUN. A GUIDER ASSEMBLY COMPENSATES FOR HIGH SPEED IMAGE MOTION. FILTERGRAMS ARE TAKEN IN ORTHOGONAL POLARIZATIONS AT 15 WAVELENGTHS SPACED 20 TO 35 MILLIANGSTROMS APART AND IN THE NEAR CONTINUUM. THEY ARE RECORDED ON SO115 FILM WITH A RESOLUTION ELEMENT OF 50 MICROMETERS PER SIDE. THE TELESCOPE AND FOCAL PLANE STRUCTURE IS 40 X 40 X 205 CM. THE PROCESSOR IS 56 X 48 X 36 CM AND THE TOTAL MASS IS 183 KG. AN AVERAGE POWER OF 322 W, 28 V DC AND A TOTAL ENERGY OF 31.8 KWH ARE USED. THE DIGITAL DATA RATE IS 2 MEGABITS/S AND THERE IS TV TRANSMISSION AT 4.2 MHZ.

----- SPACELAB 2, WILLMORE-----

INVESTIGATION NAME- HARD X-RAY IMAGING OF CLUSTERS OF GALAXIES AND OTHER EXTENDED X-RAY SOURCES

NSSDC ID- SPALAB2-07

INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
X-RAY ASTRONOMY

PERSONNEL

PI - A.P. WILLMORE	U OF BIRMINGHAM
O1 - D.K. BEDFORD	U OF BIRMINGHAM
O1 - G.F. CARPENTER	U OF BIRMINGHAM
O1 - C.J. EYLES	U OF BIRMINGHAM
O1 - J.R.H. HERRING	U OF BIRMINGHAM
O1 - G.M. SIMNETT	U OF BIRMINGHAM
O1 - G.K. SKINNER	U OF BIRMINGHAM
O1 - J.W.G. WILSON	U OF BIRMINGHAM

BRIEF DESCRIPTION

THE PURPOSE OF THIS INVESTIGATION IS TO EXAMINE THE EMISSION FROM CLUSTERS OF GALAXIES IN ORDER TO STUDY THE MECHANISMS INVOLVED IN THEIR EMISSION AND THE POSSIBLE PRESENCE OF AN INTERGALACTIC GAS. THE SPATIAL AND SPECTRAL DISTRIBUTION OF X-RAY FLUX FROM THESE CLUSTERS IN THE ENERGY RANGE FROM 2 TO 20 KEV IS STUDIED. IT IS HOPE THAT THE OBSERVATIONS WILL DISTINGUISH BETWEEN THE TWO COMPETING HYPOTHESES ON THE ORIGIN OF X-RAY EMISSION, THAT IS, THERMAL BREMSSTRAHLUNG FROM A HOT INTERGALACTIC GAS OR THE INVERSE COMPTON INTERACTIONS BETWEEN HIGH ENERGY ELECTRONS AND THE PHOTONS OF THE 2.7-K MICROWAVE BACKGROUND. THE INVESTIGATION IS ALSO USED ON OTHER X-RAY SOURCES SUCH AS THOSE OCCURRING AT THE CENTER OF OUR GALAXY.

THESE SOURCES ARE EXTREMELY WEAK AND REQUIRE A POINTING SYSTEM TO ACQUIRE SUFFICIENT OBSERVING TIME. THE INSTRUMENT IS A DOUBLE X-RAY TELESCOPE THAT USES A TECHNIQUE TO PRODUCE X-RAY IMAGES OF SMALL REGIONS OF THE SKY AT HIGHER X-RAY ENERGIES THAN IS POSSIBLE USING CONVENTIONAL METHODS. IT USES A CODED BINARY MASK AND A POSITION-SENSITIVE DETECTOR THAT PRODUCES AN X-RAY MAP OF THE SKY. THE MASK USES A SPECIAL CASE OF THE RANDOM PINHOLE MASK, WHICH PRODUCES AN IMAGE BY DECONVOLVING THE PATTERN OF THE MASK HOLES THAT PRODUCE A SHADOWGRAM ON THE POSITION-SENSITIVE DETECTOR WHEN ILLUMINATED BY RADIATION FROM THE OBJECT. THE TWO TELESCOPES HAVE DIFFERENT RESOLUTIONS. ONE HAS A COARSE RESOLUTION TO DETECT FAINT SOURCES AND AN EXTENDED REGION OF STRONGER SOURCES WHILE THE OTHER HAS A FINE RESOLUTION THAT RESOLVES FINE DETAILS IN MORE INTENSE REGIONS. THE VALUES ARE 12 X 12 ARC-MIN AND 3 X 3 ARC-MIN., RESPECTIVELY, AT FULL WIDTH HALF MAXIMUM OF THE RESPONSE AND DO NOT NECESSARILY IMPLY THE LIMITS TO THE FINENESS OF THE DETAIL THAT CAN BE DEDUCED. THE DETECTORS ARE COMPOSED OF MULTIWIRE POSITION-SENSITIVE PROPORTIONAL COUNTERS. ANTI-COINCIDENCE TECHNIQUES ARE USED TO REJECT COSMIC RAY EVENTS. A MOTORIZED GIMBAL SYSTEM IS USED TO POINT THE TELESCOPE TO WITHIN 0.5 DEG OF ANY ORIENTATION WITH RESPECT TO THE SHUTTLE. A MICROPROCESSOR SYSTEM ACCEPTS THE NOMINAL VEHICLE ATTITUDE TO SELECT A PREPROGRAMMED LIST OF TARGETS AND TO DRIVE THE TELESCOPES. A GYRO PACKAGE FOR POINTING, STAR SENSORS FOR DETERMINATION OF ABSOLUTE DIRECTIONS TO WITHIN 1 ARC-MIN, AND STAR FIELD CAMERAS FOR LONG-TERM DRIFT MOTION ARE ALSO PART OF THE INSTRUMENTATION. THE TELESCOPE'S PALLET IS 206 CM X 335 CM X 100 CM AND THE ELECTRONICS PALLET IS 40 X 30 X 30 CM. THE TOTAL MASS IS 326 KG, AND POWER IS 160 W, 28 V OF DC CURRENT. THE TOTAL ENERGY USED IS 30 KWH AND THE DIGITAL DATA RATE IS 62 KBS.

***** ST*****

SPACECRAFT COMMON NAME- ST

ALTERNATE NAMES- LARGE SPACE TELESCOPE, SPACE TELESCOPE

NSSDC ID- LST

LAUNCH DATE- 11/00/83 WEIGHT- 9100. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSS

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC	
ORBIT PERIOD- 94.5 MIN	INCLINATION- 28.8 DEG
PERIAPSIS- 500. KM ALT	APDAPSIS- 500. KM ALT

PERSONNEL

MG - J.W. KELLER	NASA HEADQUARTERS
SC - N.G. ROMAN	NASA HEADQUARTERS
PM - W.C. KEATHLEY	NASA-MSFC
PM - G.M. LEVIN	NASA-GSFC
PS - C.R. O'DELL	NASA-MSFC

BRIEF DESCRIPTION

THE SPACE TELESCOPE (ST) IS A SPACEBORNE, DIFFRACTION-LIMITED RITCHY-CRÉTEN TELESCOPE WITH THE FOLLOWING PARAMETERS: AN EFFECTIVE APERTURE OF 2.4 M, A SPATIAL RESOLUTION OF 0.1 ARC S, AND A WAVELENGTH COVERAGE FROM 0.1 TO 1000 MICROMETERS. THE EXPECTED LIMITING MAGNITUDE IS BETWEEN 27 AND 28. THIS IS 10 TIMES BETTER RESOLUTION AND GREATER WAVELENGTH COVERAGE THAN GROUND-BASED TELESCOPES, AND DETECTS OBJECTS THAT ARE 50 TIMES FAINTER. THE TELESCOPE IS CAPABLE OF ACCOMMODATING FIVE DIFFERENT INSTRUMENTS AT ITS FOCAL PLANE. THE SPACE SHUTTLE IS USED FOR INITIAL LAUNCH, IN-ORBIT SERVICING, AND FOR RETURN OF THE ST TO THE GROUND FOR MAINTENANCE. THE ANTICIPATED MINIMUM OPERATIONAL LIFETIME, EXCLUDING DOWNTIME FOR PERIODIC MAINTENANCE AND UPDATING, IS GREATER THAN 15 YR. THE ST SYSTEM SERVES AS A NATIONAL ASTRONOMICAL SPACE OBSERVATORY FACILITY. THE USE OF THE ONBOARD INSTRUMENTATION IS OPEN TO SCIENTISTS OF ALL COUNTRIES. ITS DESIGN IS FLEXIBLE TO ALLOW FOR THE REPLACEMENT OF SCIENTIFIC INSTRUMENTATION WHEN NECESSARY, TO INCORPORATE TECHNOLOGICAL ADVANCES, AND TO SATISFY CHANGES IN THE OBSERVATIONAL INTERESTS OF THE ASTRONOMICAL COMMUNITY. INSTRUMENTATION UPDATING, REPAIR, OR REPLACEMENT CAN BE ACCOMPLISHED EITHER BY RETURN OF THE ST TO THE GROUND, OR BY USING SUITED ASTRONAUTS FOR IN-ORBIT WORK.

----- ST, BLESS-----

INVESTIGATION NAME- HIGH-SPEED PHOTOMETER (HSP)

NSSDC ID- LST -06

INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - R.C. BLESS	U OF WISCONSIN
O1 - G.W. VAN CITTERS	U OF TEXAS, AUSTIN
O1 - E.L. ROBINSON	U OF TEXAS, AUSTIN
O1 - J.L. ELLIOT	CORNELL U
O1 - A.D. CODE	U OF WISCONSIN

BRIEF DESCRIPTION

THE HIGH-SPEED PHOTOMETER (HSP) INVESTIGATION MAKES FAST-TIME-RESOLUTION (1 MS AND SLOWER) PHOTOMETRIC OBSERVATIONS OF RAPIDLY VARYING OBJECTS IN THE SPECTRAL RANGE 1150-8500 Å AND LINEAR POLARIMETRIC OBSERVATIONS FROM 2100 TO 7000 Å OF A WIDE VARIETY OF OBJECTS. IT ESTABLISHES AN ACCURATE LINK BETWEEN OBSERVATIONS MADE ON EXISTING VISUAL AND UV PHOTOMETRIC SYSTEMS AND THE CORRESPONDING OBSERVATIONS OF THE FAINT OBJECTS OBSERVED BY THE SPACE TELESCOPE. THE INSTRUMENT CONSISTS OF TWO IMAGE DISSECTORS - ONE SENSITIVE IN THE UV AND SOLAR BLIND, THE OTHER SENSITIVE IN THE VISIBLE AND NEAR INFRARED. A WIDE VARIETY OF BANDPASSES ARE FORMED BY BROADBAND AND INTERFERENCE FILTERS ARRANGED IN STRIPS ACROSS THE DISSECTOR TUBE'S PHOTOCATHODE. SOME OF THE FILTERS ARE COATED WITH A POLARIZING MATERIAL. DIAPHRAGMS PROVIDE A CHOICE OF THREE FIELDS OF VIEW: 0.7, 1.4, AND 2.8 ARC S. THE DISSECTORS CAN BE COMMANDED TO RECEIVE PHOTOELECTRONS FROM ANY OF THE APPROXIMATELY 100 FILTER-DIAPHRAGM-POLARIZER COMBINATIONS AVAILABLE. THE TWO DETECTORS CAN BE LOCATED INSIDE OR OUTSIDE OF AN AXIAL INSTRUMENT BAY, WITH NO ADDITIONAL OPTICS REQUIRED.

----- ST. BRANDT -----

INVESTIGATION NAME- HIGH-RESOLUTION SPECTROGRAPH (HRS)

NSSDC ID- LST -02

INVESTIGATIVE PROGRAM
CODE SC/CO-OPINVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - J.C. BRANDT	NASA-GSFC
OI - A. BOGGESS, JR.	NASA-GSFC
OI - E.A. BEAVER	U OF CALIF, SAN DIEGO
OI - S.R. HEAP	NASA-GSFC
OI - J.B. HUTCHINGS	DOMINION ASTROPHYS OBS
OI - M.A. JURA	U OF CALIF, LA
OI - J.L. LINSKY	U OF COLORADO
OI - S.P. MAMAN	NASA-GSFC
OI - B.D. SAVAGE	U OF WISCONSIN
OI - A.M. SMITH	NASA-GSFC
OI - L.M. TRAFTON	U OF TEXAS, AUSTIN
OI - R.J. WEYMANN	U OF ARIZONA

BRIEF DESCRIPTION

THIS INVESTIGATION USES AN ULTRAVIOLET SPECTROGRAPH CAPABLE OF OBTAINING HIGH-QUALITY SPECTRA AT TWO RESOLVING POWERS: 20,000 AND 120,000. THE LOWER DISPERSION IS ACHIEVED WITH FOUR GRATINGS THAT COVER THE SPECTRAL RANGE 1100-3200 Å SO THAT EACH GRATING IS USED ONLY NEAR ITS MAXIMUM BLAZE EFFICIENCY. THE HIGHER DISPERSION UTILIZES AN ECHELLE ARRANGEMENT. THE SENSOR IS A MULTI-CHANNEL PULSE-COUNTING DEVICE, THE DIGICON. THIS DETECTOR OPERATES FUNCTIONALLY LIKE AN IMAGE-DISSECTOR TUBE AND CAN BE USED AS AN IMAGE DISSECTOR TO PERFORM STAR CENTERING AND FIELD MAPPING OF THE ENTRANCE APERTURE, ELIMINATING THE NEED FOR A SEPARATE STAR TRACKER OR SLIT CAMERA. THERE ARE TWO DETECTORS, ONE WITH A CSTE PHOTOCATHODE AND ONE WITH CSI. THE TWO TARGET ENTRANCE APERTURES HAVE FIELDS OF VIEW OF 1 SQ ARC S AND 0.3 SQ ARC S, RESPECTIVELY. THERE ARE NO SIGNIFICANT TIME CONSTRAINTS. THE HIGH RESOLUTION SPECTROGRAPH (HRS) OPERATES IN SUNLIGHT SO THAT IT CAN BE UTILIZED AT ALL TIMES, EXCEPT WHEN THE SOURCE IS OCCULTED BY THE EARTH OR MOON. THE HIGH DYNAMIC RANGE AND CHOICE OF DISPERSIONS MAKE IT POSSIBLE TO OBSERVE A LARGE RANGE OF STELLAR MAGNITUDES, FROM VERY BRIGHT TO MODERATELY FAINT. THE HRS BRIDGES THE GAP BETWEEN OBJECTS OBSERVED BY ROCKET-BORNE SPECTROGRAPHS, COPERNICUS, IUE, AND THE FAINT-OBJECT SPECTROGRAPH (FOS).

----- ST. HARMS -----

INVESTIGATION NAME- FAINT-OBJECT SPECTROGRAPH (FOS)

NSSDC ID- LST -03

INVESTIGATIVE PROGRAM
CODE SC/CO-OPINVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - R.J. HARMS	U OF CALIF, SAN DIEGO
OI - F. BARTKO, JR.	MARTIN-MARIETTA AEROSP
OI - E.A. BEAVER	U OF CALIF, SAN DIEGO
OI - H.C. FORD	U OF CALIF, LA
OI - B. MARGON	U OF CALIF, LA
OI - A.F. DAVIDSEN	JOHNS HOPKINS U
OI - E.M. BURBRIDGE	U OF CALIF, SAN DIEGO
OI - J.R. ANGEL	U OF ARIZONA

BRIEF DESCRIPTION

THE FAINT-OBJECT SPECTROGRAPH (FOS) INVESTIGATION OBTAINS SPECTRA OF ASTRONOMICAL OBJECTS AT THE FAINTEST POSSIBLE LIMITING MAGNITUDE IN ULTRAVIOLET AND VISIBLE WAVELENGTHS. THE SPECTROGRAPH COVERS A BROAD SPECTRAL RANGE AND IS INTENDED FOR SPECTROSCOPY PRIMARILY AT MODEST SPECTRAL RESOLUTION. THE SPECTRAL PROFILES OF BROAD EMISSION AND ABSORPTION FEATURES AND CONTINUUM FLUX DISTRIBUTIONS ARE OBSERVED IN BOTH EXTENDED AND POINT SOURCES. THE FOS DESIGN IS BASED ON A FIXED-SLOT SPECTROGRAPH WITH THE CAPABILITY OF SELECTING EITHER OF TWO SPECTRAL RESOLVING POWERS (100 OR 1000) OVER THE WAVELENGTH RANGE 1140-10,000 Å. A NONDISPERSIVE MODE IS ALSO AVAILABLE, PROVIDING CAMERA IMAGES FOR SCIENTIFIC AND TARGET ACQUISITION PURPOSES. A POLARIZATION-ANALYZER CAPABILITY IS PROVIDED OVER

THE WAVELENGTH RANGE 1800-2050 Å. THE FOS USES A 512-DIODE LINEAR ARRAY OF PHOTON-COUNTING DIGICONS AS DETECTORS. TO COVER THE FULL WAVELENGTH RANGE, TWO DETECTORS ARE USED. THE ULTRAVIOLET/VISIBLE SENSOR HAS A MAGNESIUM FLUORIDE FACEPLATE AND A BIALKALI PHOTOCATHODE. THE VISIBLE/NEAR-IR SENSOR HAS THE SAME WINDOW MATERIAL AND AN EXTENDED-RED TRIALKALI PHOTOCATHODE. FOR THE FAINTEST OBJECTS, INTEGRATION TIMES ARE LONG.

----- ST. JEFFERYS -----

INVESTIGATION NAME- ASTROMETRY SCIENCE

NSSDC ID- LST -09

INVESTIGATIVE PROGRAM
CODE SC/CO-OPINVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - W.H. JEFFERYS	U OF TEXAS, AUSTIN
OI - G.F. BENEDICT	U OF TEXAS, AUSTIN
OI - P.D. HEMENWAY	U OF TEXAS, AUSTIN
OI - P.J. SHELUS	U OF TEXAS, AUSTIN
OI - R.L. DUNCOMBE	U OF TEXAS, AUSTIN
OI - W.F. VAN ALTENA	YALE U
OI - O.G. FRANZ	LOWELL OBSERVATORY
OI - L.W. FREDERICK	U OF VIRGINIA

BRIEF DESCRIPTION

THIS INVESTIGATION USES THE FACILITIES OF THE OPTICAL TELESCOPE ASSEMBLY, INSTEAD OF REQUIRING A SEPARATE INSTRUMENT. THE SPACE TELESCOPE (ST) FINE GUIDANCE SYSTEM (FGS) CONSISTS OF THREE IDENTICAL SENSORS DISTRIBUTED IN AN ANNULUS CENTERED ON THE OPTICAL AXIS OF THE ST. EACH SENSOR HAS ITS OWN FIELD OF VIEW (FOV). IN NORMAL OPERATIONS, TWO OF THE SENSORS ARE USED FOR FINE POINTING THE ST. THE SENSOR THAT IS NOT USED FOR TELESCOPE POINTING IS THE PRIMARY ASTROMETRIC INSTRUMENT AT THAT PARTICULAR TIME. AN FGS SENSOR CONSISTS OF A SET OF GIMBALED MIRRORS SUCH THAT ANY STAR WITHIN ITS FOV CAN BE PLACED ON AN IMAGE DISSECTOR/INTERFEROMETER COMBINATION. THE ENCODER READINGS OF THE GIMBALED MIRROR AXES SUPPLY THE OBJECT POSITION IN THE FOV; THE OUTPUT OF EACH OF THE PAIR OF INTERFEROMETERS SUPPLIES A FINE ERROR SIGNAL. EACH SENSOR CONTAINS A SET OF MOVABLE FILTERS; AND TEMPERATURE, VOLTAGE, AND OTHER MONITORS. THE ASTROMETRY EXPERIMENTER OBSERVES STARS IN AN APPROXIMATE MAGNITUDE RANGE OF 3-20. THE EXPERIMENT HAS THE CAPABILITY OF OBSERVING 10 OBJECTS OF THE 17TH MAGNITUDE IN 10 MIN.

----- ST. VAN DE HULST -----

INVESTIGATION NAME- FAINT-OBJECT CAMERA (FOC)

NSSDC ID- LST -08

INVESTIGATIVE PROGRAM
CODE SC/CO-OPINVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - H.C. VAN DE HULST	HUYGENS LAB
OI - I.R. KING	U OF CALIF, BERKELEY
OI - P. CRANE	EUROP SO OBS, SWITZ
OI - R. ALBRECHT	U OF VIENNA
OI - C. BARBIERI	U OF PADOVA
OI - A. BOKSENBURG	U COLLEGE LONDON
OI - M.J. DISNEY	U COLLEGE CARDIFF
OI - T.M. KAMPERMAN	ASTRONOMICAL INST
OI - C.D. MACKAY	U OF CAMBRIDGE
OI - R.M. WILSON	EUROP SO OBS, SWITZ
OI - J.W. DEHARVENG	CNRS-LAS

BRIEF DESCRIPTION

THE FAINT-OBJECT CAMERA (FOC) INVESTIGATION USES AN IMAGING CAMERA WITH A TWO-DIMENSIONAL PHOTON-EVENT COUNTING DETECTOR, OPERATING AT A HIGH FOCAL RATIO, WHICH FULLY EXPLOITS THE SPATIAL RESOLVING POWER OF THE ST, AND IS ABLE TO DETECT OBJECTS THAT ARE 50 TIMES FAINTER THAN THOSE OBSERVABLE WITH THE MOST POWERFUL EARTHBOUND TELESCOPE. THE FOC HAS A MINIMUM FORMAT OF 200 X 200 PIXELS. BASED ON A PIXEL SIZE OF 25 X 25 MICROMETERS, A FOCAL RATIO OF APPROXIMATELY F/96 IS REQUIRED TO EXPLOIT THE SPATIAL RESOLVING POWER OF THE ST. AT THAT FOCAL RATIO, THE PIXEL SIZE IS 0.022 X 0.022 SQ ARC S AND THE FIELD OF VIEW OF A 200 X 200 PIXEL CAMERA IS 4.4 X 4.4 SQ ARC S. FOR IMAGERY AND PHOTOMETRY OF VERY FAINT STARS AND EXTENDED SOURCES, CUMULATIVE EXPOSURES ARE REQUIRED TO OBTAIN A USEFUL SIGNAL-TO-NOISE RATIO. THE WAVELENGTH RANGE IS 1200 TO 8000 Å AND THE DYNAMIC RANGE IS FROM 21ST TO 28TH VISUAL MAGNITUDE FOR POINT SOURCES, AND FROM 15TH TO 22ND VISUAL MAGNITUDE/SQ ARC S FOR EXTENDED SOURCES.

----- ST. WESTPHAL -----

INVESTIGATION NAME- WIDE-FIELD CAMERA (WFC)

NSSDC ID- LST -07

INVESTIGATIVE PROGRAM
CODE SC/CO-OPINVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
 PI - J.A. WESTPHAL
 OI - W.A. BAUM
 OI - D. CURRIE
 OI - G.E. DANIELSON
 OI - B.A. SMITH
 OI - A.D. CODE
 OI - J.E. GUNN
 OI - J. KRISTIAN
 OI - C.R. LYNDOS
 OI - P.K. SEIDELMANN

CALIF INST OF TECH
 LOWELL OBSERVATORY
 U OF MARYLAND
 NASA-JPL
 U OF ARIZONA
 U OF WISCONSIN
 CALIF INST OF TECH
 CALIF INST OF TECH
 KITZ PEAK NATL OBS
 US NAVAL OBSERVATORY

BRIEF DESCRIPTION
 THE WIDE-FIELD CAMERA INVESTIGATION USES TWO CAMERAS OF DIFFERENT FOCAL LENGTHS HOUSED IN A SINGLE PLANETARY RADIAL BAY. ONE IS A WIDE-FIELD CAMERA AND THE OTHER IS A PLANETARY CAMERA. EACH CAMERA USES A SIMPLE OPTICAL MOSAIC TECHNIQUE IN CONJUNCTION WITH FOUR CHARGE-COUPLED DEVICES (CCD) AS DETECTORS, EACH HAVING 800 X 800 PICTURE ELEMENTS. EACH CCD IS THINNED FOR BACK-SIDE ILLUMINATION, AND THEIR SPECTRAL RESPONSES ARE EXTENDED SHORTWARD FROM THE VISIBLE TO THE VACUUM ULTRAVIOLET BY SPECIAL PROCESSING. THE OVERALL QUANTUM EFFICIENCY OF THE INSTRUMENT IS ABOUT 10 PERCENT FROM LYMAN ALPHA (1216 A) TO 3500 A, RISING RAPIDLY TO ABOUT 50 PERCENT FROM 4500 TO 8000 A, THEN GRADUALLY DECREASING INTO THE INFRARED. THE COMBINATION OF THE OPTICAL MOSAIC AND CCD DETECTORS PROVIDES A CONTIGUOUS FIELD WITH AN OVERALL SIZE OF 1600 X 1600 PIXELS. FOCAL RATIOS OF F/12.9 AND F/30 GIVE FIELD SIZES OF 2.67 SQ ARC MIN AT A RESOLUTION OF 0.1 ARC S PER PIXEL FOR THE WIDE-FIELD CAMERA AND 68.7 SQ ARC S AT 0.043 ARC S PER PIXEL FOR THE PLANETARY CAMERA. THE INSTRUMENT CONTAINS SPACE FOR 50 FILTERS, POLARIZERS/FILTERS, AND TRANSMISSION GRATINGS.

***** STP P80-1*****

SPACECRAFT COMMON NAME- STP P80-1
 ALTERNATE NAMES- SPACE TEST PROGRAM P80-1, P80-1

NSSDC ID- P80-1

LAUNCH DATE- 2 QTR 81
 LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
 LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
 UNITED STATES DOD-USAF

PLANNED ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC
 ORBIT PERIOD- 99.6 MIN
 PERIAPSIS- 740.8 KM ALT
 INCLINATION- 72.5 DEG
 APOAPSIS- 740.8 KM ALT

PERSONNEL
 PM - J.N. JENSEN
 PS - J.R. STEVENS
 USAF-SAMSO
 AEROSPACE CORP

BRIEF DESCRIPTION
 SPACE TEST PROGRAM P80-1 IS A DOD SATELLITE WHICH IS ESSENTIALLY A RECTANGULAR PARALLELEPIPED OF APPROXIMATE DIMENSIONS 2.4 X 2.4 X 0.7 METERS. IT HAS A CIRCULAR ORBIT AND IS THREE-AXIS STABILIZED TO MAINTAIN ONE 2.4 X 2.4 METER SURFACE VECTOR NADIR POINTING. THE SPACECRAFT SERVES AS A STABLE PLATFORM REFERENCE FOR THREE EXPERIMENT TELESCOPES. TELEMETRY CAPABILITY IS PCM AND USES ON-BOARD STORAGE TAPE RECORDERS WITH UP TO 6 HOURS STORAGE.

----- STP P80-1, BOWYER-----

INVESTIGATION NAME- EXTREME ULTRAVIOLET PHOTOMETER

NSSDC ID- P80-1 -03
 INVESTIGATIVE PROGRAM
 SPACE TEST PROGRAM
 INVESTIGATION DISCIPLINE(S)
 ATMOSPHERIC PHYSICS
 EARTH RESOURCES SURVEY
 ASTRONOMY

PERSONNEL
 PI - C.S. BOWYER
 OI - D. FINLEY
 U OF CALIF, BERKELEY
 U OF CALIF, BERKELEY

BRIEF DESCRIPTION
 THE EXTREME-ULTRAVIOLET PHOTOMETER INVESTIGATION CONSISTS OF TWO IMAGING GRAZING-INCIDENCE TELESCOPES WITH SEVERAL BROADBAND FILTERS SENSITIVE TO EXTREME AND FAR ULTRAVIOLET RADIATION. ONE TELESCOPE IS NADIR-LOOKING AND THE OTHER IS ZENITH-LOOKING. THE ORBITAL MOTION OF THE SPACECRAFT PROVIDES A SCANNING FUNCTION, RESULTING IN A MAPPING OF EARTH AND SKY IN THE WAVELENGTH REGIONS OF INTEREST THROUGHOUT THE MISSION.

----- STP P80-1, LARSON-----

INVESTIGATION NAME- TEAL RUBY

NSSDC ID- P80-1 -01
 INVESTIGATIVE PROGRAM
 SPACE TEST PROGRAM
 INVESTIGATION DISCIPLINE(S)
 EARTH RESOURCES SURVEY

PERSONNEL
 PI - J.C. LARSON
 LOCKHEED PALO ALTO

BRIEF DESCRIPTION
 THIS INVESTIGATION USES AN INFRARED TELESCOPE AND DETECTION SYSTEM WHICH HAS A MULTISPECTRAL MOSAIC FOCAL PLANE TO MEASURE SIGNAL STRENGTH IN A VARIETY OF SPECTRAL BANDS IN THE INFRARED. IT GATHERS EARTH BACKGROUND DATA AND TESTS TECHNIQUES FOR IR DETECTION AND DATA REDUCTION.

----- STP P80-1, POWER-----

INVESTIGATION NAME- ION AUXILIARY PROPULSION SYSTEM

NSSDC ID- P80-1 -02
 INVESTIGATIVE PROGRAM
 SPACE TEST PROGRAM
 INVESTIGATION DISCIPLINE(S)
 TECHNOLOGY

PERSONNEL
 PI - J.L. POWER
 NASA-LERC

BRIEF DESCRIPTION
 THE ION AUXILIARY PROPULSION SYSTEM WILL TEST TWO MERCURY ION THRUSTERS, EACH PRODUCING ONE MILLIPOUND OF THRUST. THESE ARE CONFIGURED ON THE SPACECRAFT TO BE REPRESENTATIVE OF THRUSTER'S USE FOR STATIONKEEPING AND MANEUVERING. INSTRUMENTATION PROVIDES THRUSTER PERFORMANCE AND MEASURES THE EFFECTS OF THE THRUSTERS ON OTHER SPACECRAFT COMPONENTS AND FUNCTIONS.

***** STP P80-2*****

SPACECRAFT COMMON NAME- STP P80-2
 ALTERNATE NAMES- SPACE TEST PROGRAM P80-2, P80-2
 SIRE

NSSDC ID- P80-2

LAUNCH DATE- 1 QTR 81
 LAUNCH SITE- VANDENBERG AFB, UNITED STATES
 LAUNCH VEHICLE- ATLAS F

SPONSORING COUNTRY/AGENCY
 UNITED STATES DOD-USAF

PLANNED ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC
 ORBIT PERIOD- 99. MIN
 PERIAPSIS- 740. KM ALT
 INCLINATION- 98.3 DEG
 APOAPSIS- 740. KM ALT

PERSONNEL
 PM - W.J. NIEMANN
 PS - J.R. STEVENS
 USAF-SAMSO
 AEROSPACE CORP

BRIEF DESCRIPTION
 THE SPACE TEST PROGRAM P80-2 SPACECRAFT IS AN ASCENT AGENA (SIMILAR TO SEASAT) WHICH IS MODIFIED TO CARRY ORBITAL EXPERIMENTS ON THE FORWARD STRUCTURE. HIGH ELECTRIC POWER REQUIREMENTS ARE MET BY FLEXIBLE ROLL OUT SOLAR ARRAY PANELS WHICH EXTEND FROM THE AGENA. THE TWILIGHT SUN-SYNCHRONOUS ORBIT ALLOWS DEPLOYMENT OF THE ARRAY PERPENDICULAR TO THE INSOLATION VECTOR. EXPERIMENT DATA MAY BE READ OUT BY GROUND STATIONS OR MAY BE RECORDED FOR SUBSEQUENT TRANSMISSION TO THE GROUND STATIONS. THE INVESTIGATIONS WILL TEST A DEEP SPACE VIEWING INFRARED TELESCOPE WITH ACTIVE CRYOGENIC REFRIGERATION, AND MEASURE SOLAR FLARE ISOTOPIC COMPOSITION.

----- STP P80-2, LYONS-----

INVESTIGATION NAME- SATELLITE INFRARED (SIRE)

NSSDC ID- P80-2 -01
 INVESTIGATIVE PROGRAM
 SPACE TEST PROGRAM
 INVESTIGATION DISCIPLINE(S)
 ASTRONOMY

PERSONNEL
 PI - J. LYONS
 USAF-SAMSO

BRIEF DESCRIPTION
 THIS INVESTIGATION EMPLOYS AN ACTIVELY CRYO-COOLED TELESCOPE FOCAL PLANE WITH MULTIPLE FILTER BANDS FOR OBSERVATION OF STAR AND GALACTIC RADIANCE PROFILES AND AURORAS. THE TELESCOPE IS GIMBALED FOR 1 DEGREE-OF-FREEDOM SCANS, RELYING ON SPACECRAFT MANEUVERS AND OPTICAL FOV FOR ADDITIONAL OBSERVATIONAL SCOPE. THE REFRIGERATOR IS AN ELECTRICALLY POWERED VUILLUMIER CYCLE MACHINE OF THE TYPE FLOWN ON PREVIOUS STP FLIGHTS.

----- STP P80-2, SIMPSON-----

INVESTIGATION NAME- COSMIC RAY ISOTOPE (CRIE)

NSSDC ID- P80-2 -02

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM/CODE ST

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - J.A. SIMPSON	U OF CHICAGO
OI - M. GARCIA-MUNOZ	U OF CHICAGO
OI - J.P. WEFEL	U OF CHICAGO

BRIEF DESCRIPTION

THE PRIMARY OBJECTIVES OF THIS INVESTIGATION ARE TO: (1) STUDY SOLAR FLARE ENERGY CONVERSION AND SOLAR ACCELERATION MECHANISMS, AND (2) TO MONITOR SOLAR FLARE PARTICLE FLUXES. OBJECTIVE (1) IS DONE THROUGH THE IDENTIFICATION OF ISOTOPES WHOSE PRESENCE IS A MEASURE OF THE AMOUNT OF SOLAR MATTER TRAVERSED DURING ACCELERATION AND THE TIME SPENT WITHIN THE SOLAR CORONA. THE INSTRUMENT PACKAGE CONTAINS THREE MULTI-ELEMENT SOLID-STATE DETECTOR TELESCOPES. THE HIGH-ENERGY TELESCOPE IS USED TO RESOLVE ISOTOPES FROM HYDROGEN TO NICKEL IN THE ENERGY RANGE 20 TO 500 MEV/NUCLEON, AND ITS VIEW ANGLE IS 93 DEG (FULL CONE). THE LOW-ENERGY TELESCOPE IS USED TO RESOLVE ISOTOPES FROM HELIUM TO NICKEL IN THE RANGE 4 TO 230 MEV/NUCLEON, AND ITS VIEW ANGLE IS 80 DEG. THE MONITOR TELESCOPE DETECTS PROTONS FROM 0.5 TO 3.2 MEV AND HELIUM FROM 0.7 TO 2.5 MEV/NUCLEON. ITS VIEW ANGLE IS 75.4 DEG. DATA RATES ARE ONE 360-BIT WORD/S FOR THE HIGH-ENERGY TELESCOPE AND ONE 360-BIT WORD/S FOR THE LOW-ENERGY AND MONITOR TELESCOPES COMBINED.

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**INDEX OF ACTIVE AND PLANNED SPACECRAFT
AND EXPERIMENTS**

4. INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS

This index contains the names of all spacecraft and experiments that were either active sometime between July 1, 1978, and May 31, 1979, or planned as of May 31, 1979. The spacecraft are listed alphabetically by both common name and alternate names. The alternate names are printed with a reference to the NSSDC spacecraft common name. Next to the NSSDC spacecraft common name are printed the sponsoring country and agency, launch date, orbit type, NSSDC ID code, and the current status. The current state includes the epoch date, status, and data rate of all launched spacecraft and experiments. For prelaunch spacecraft, only the status is shown; there is no information shown for prelaunch spacecraft experiments. The status and data rate, for the most part, reflect the state as of May 31, 1979, that became effective on the listed epoch date. However, a few changes subsequent to this date may appear. An explanation of the terms used in these columns may be found in Appendix C. The experiments are listed following the associated spacecraft common name and are ordered alphabetically by the principal investigator's or team leader's last name. The experiment name, NSSDC ID code, and current state are also given for each experiment. Finally, each name is followed by a page number referencing the description of the spacecraft or experiment found in this report.

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

* SPACECRAFT NAME ***** *PRINC.INVEST.NAME *	COUNTRY AND AGENCY ***** EXPERIMENT NAME *****	LAUNCH DATE	ORBIT TYPE	* NSSDC ID *****	-----CURRENT STATUS----- EPOCH MMDDYY	STATUS	DATA RATE	PAGE NO.
1976-059A HIGBIE	UNITED STATES ENERGETIC PARTICLE DETECTOR	DOD-USAF 06/26/76	GEOCENTRIC	76-059A 76-059A-01	06/27/76 06/27/76	NORMAL NORMAL	STND STND	11 11
1977-007A HIGBIE	UNITED STATES ENERGETIC PARTICLE DETECTOR	DOD-USAF 02/06/77	GEOCENTRIC	77-007A 77-007A-01	02/07/77 02/07/77	NORMAL NORMAL	STND STND	11 11
AE 5	SEE AE-E							
AE-C BARTH BRACE BRINTON CHAMPION DOERING HANSON HAYS HINTEREGGER HOFFMAN HOFFMAN SPENCER	UNITED STATES NASA-OSS ULTRAVIOLET NITRIC-OXIDE (UVNO) CYLINDRICAL ELECTROSTATIC PROBES (CEP) BENNETT ION-MASS SPECTROMETER (BIMS) ATMOSPHERIC DENSITY ACCELEROMETER (MESA) PHOTOELECTRON SPECTROMETER (PES) RETARDING POTENTIAL ANALYZER/DRIFT METER (RPA) VISIBLE AIRGLOW PHOTOMETER (VAE) SOLAR EUV SPECTROPHOTOMETER (EUVS) MAGNETIC ION-MASS SPECTROMETER (MIMS) LOW-ENERGY ELECTRONS (LEE) NEUTRAL ATMOSPHERE TEMPERATURE (NATE)	12/16/73	GEOCENTRIC	73-101A 73-101A-13 73-101A-01 73-101A-11 73-101A-02 73-101A-03 73-101A-04 73-101A-14 73-101A-06 73-101A-10 73-101A-12 73-101A-09	12/12/78 12/12/78 12/12/78 12/12/78 12/12/78 12/12/78 12/12/78 12/12/78 12/12/78 12/12/78 12/12/78 12/12/78	INOPERABLE INOPERABLE INOPERABLE INOPERABLE INOPERABLE INOPERABLE INOPERABLE INOPERABLE INOPERABLE INOPERABLE INOPERABLE INOPERABLE	ZERO ZERO ZERO ZERO ZERO ZERO ZERO ZERO ZERO ZERO ZERO ZERO	11 12 12 12 12 13 13 13 13 14 14 14
AE-E BRACE BRINTON CHAMPION DOERING HANSON HAYS HEATH HEDIN HINTEREGGER NIER RICE RICE SPENCER	UNITED STATES NASA-OSS CYLINDRICAL ELECTROSTATIC PROBE (CEP) BENNETT ION-MASS SPECTROMETER (BIMS) ATMOSPHERIC DENSITY ACCELEROMETER (MESA) PHOTOELECTRON SPECTROMETER (PES) RETARDING POTENTIAL ANALYZER/DRIFT METER (RPA) VISIBLE AIRGLOW PHOTOMETER (VAE) BACKSCATTER UV SPECTROMETER (BUV) NEUTRAL ATMOSPHERE COMPOSITION (NACE) SOLAR EUV SPECTROPHOTOMETER (EUVS) OPEN-SOURCE NEUTRAL MASS SPECTROMETER (OSS) CAPACITANCE MANOMETER COLD CATHODE ION GAUGE NEUTRAL ATMOSPHERE TEMPERATURE (NATE)	11/20/75	GEOCENTRIC	75-107A 75-107A-01 75-107A-10 75-107A-02 75-107A-03 75-107A-04 75-107A-11 75-107A-16 75-107A-08 75-107A-06 75-107A-07 75-107A-12 75-107A-13 75-107A-09	11/20/75 12/00/75 12/11/75 12/04/75 12/00/75 12/00/75 12/11/75 12/18/78 12/11/75 12/00/75 12/11/75 12/04/75 12/04/75 12/11/75	NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL	STND STND STND STND STND STND STND STND STND STND STND STND STND STND	14 14 15 15 15 15 16 16 16 16 16 17 17 17
AEM-A	SEE HCMH							
AEM-B	SEE SAGE							
AEM-C	SEE MAGSAT							
AEM-D	SEE ERBS-A							
AEROS	SEE SMS 1							
AMPT/CHARGE COMP EXPL	SEE CCE							
AMPT/ION RELEASE MODULE	SEE IRM							
APPL EXPL MISSION A	SEE HCMH							
APPL EXPL MISSION B	SEE SAGE							
ARIEL 5	SEE UK 5							
ARIEL 6	SEE UK 6							
ASTRO-A HIRAO KONDO MATSUOKA NISHI TAKAKURA TAKEUCHI	JAPAN ISAS ELECTRON DENSITY AND TEMPERATURE PLASMA PROBES SOLAR FLARE GAMMA-RAY DETECTOR IN 0.4-7 MEV RANGE TIME PROFILE AND SPECTRA OF X-RAY FLARES IN THE 2-60 KEV RANGE SOLAR FLARE X-RAY BRAGG SPECTROSCOPY IN 1.5-2.0 A RANGE SOLAR FLARE X-RAYS IN RANGE OF 10-60 KEV USING ROTATING COLLIMATOR IMAGING ELECTRON FLUX ABOVE 100 KEV PARTICLE DETECTOR MONITOR	02/00/81	GEOCENTRIC	ASTRO-A ASTRO-A-06 ASTRO-A-04 ASTRO-A-03 ASTRO-A-02 ASTRO-A-01 ASTRO-A-05	APPROVED MISSION			127 127 127 127 127 127 127
ASTRONOMICAL SATELLITE-A	SEE ASTRO-A							
ATMOSPHERE EXPLORER-C	SEE AE-C							
ATMOSPHERE EXPLORER-E	SEE AE-E							

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

* SPACECRAFT NAME		COUNTRY AND AGENCY	LAUNCH DATE	ORBIT TYPE	-----CURRENT STATUS-----				
*PRINC. INVEST. NAME	EXPERIMENT NAME				NSSDC ID	EPOCH MDDYY	STATUS	DATA RATE	PAGE NO.
ATS 6	ARNOLDY	UNITED STATES	NASA-OSTA 05/30/74	GEOCENTRIC	74-039A	06/30/79	PARTIAL	ZERO	17
	DAVIES	LOW-ENERGY PROTON/ELECTRON EXPERIMENT			74-039A-03	06/30/79	PARTIAL	ZERO	18
	DUNKERLY	RADIO BEACON			74-039A-09	06/30/79	PARTIAL	ZERO	18
	FRITZ	SOLAR CELL RADIATION DAMAGE			74-039A-16	10/01/78	INOPERABLE	ZERO	18
	GALICINAO	MEASUREMENT OF LOW-ENERGY PROTONS			74-039A-01	06/30/79	PARTIAL	ZERO	18
	GALICINAO	TRACKING AND DATA RELAY			74-039A-18	06/30/79	PARTIAL	ZERO	18
	GALICINAO	POSITION, LOCATION AND AIRCRAFT COMMUNICATION			74-039A-19	06/30/79	PARTIAL	ZERO	18
	KAMPINSKY	R.F. INTERFEROMETER SUBSYSTEM			74-039A-29	06/30/79	PARTIAL	ZERO	19
	MASLEY	SOLAR COSMIC RAYS AND GEOMAGNETICALLY TRAPPED RADIATION			74-039A-06	06/30/79	PARTIAL	ZERO	19
	MILLER	TELEVISION RELAY USING SMALL TERMINALS			74-039A-28	06/30/79	PARTIAL	ZERO	19
	PAULIKAS	OMNIDIRECTIONAL SPECTROMETER			74-039A-07	06/30/79	PARTIAL	ZERO	19
	WHALEM	HEALTH AND EDUCATION TELECOMMUNICATIONS			74-039A-24	06/30/79	PARTIAL	ZERO	19
ATS-F	SEE ATS 6								
BERKSAT	SEE EUVE								
BHASKARA	INDIA	ISRO	06/07/79	GEOCENTRIC	79-051A	06/07/79	NORMAL	STND	19
CAMEO	HEPPNER	UNITED STATES	NASA-OSS 10/24/78	GEOCENTRIC	78-098B	11/06/78	INOPERABLE	ZERO	20
		BARUM AND LITHIUM RELEASE MODULES			78-098B-01	11/06/78	INOPERABLE	ZERO	20
CASTOR	SEE D5-B								
CCE	GLOECKLER	UNITED STATES	NASA-OSS 03/00/83	GEOCENTRIC	CCE		PROPOSED MISSION		127
	MCENTIRE	CHARGE-ENERGY-MASS SPECTROMETER (CHEM)			CCE -03				128
	SHELLEY	MEDIUM ENERGY PARTICLE ANALYZER (MEPA)			CCE -02				128
		PLASMA COMPOSITION			CCE -01				128
CHARGE COMPOSITION EXPL	SEE CCE								
CHEM ACT MATLS EJECT ORB	SEE CAMEO								
COBE	HAUSER	UNITED STATES	NASA-OSS 10/01/85	GEOCENTRIC	COBE		PROPOSED MISSION		128
		DIFFUSE INFRARED BACKGROUND EXPERIMENT (DIRBE)			COBE -02				128
	MATHER	FAR INFRARED ABSOLUTE SPECTROPHOTOMETER (FIRAS)			COBE -01				129
	SMOOT	DIFFERENTIAL MICROWAVE RADIOMETERS (DMR)			COBE -03				129
COPERNICUS	SEE OAO 3								
CORSA-B	SEE HAKUCHO								
COS-B	CARAVANE COLLABOR.	INTERNATIONAL	ESA 08/09/75	GEOCENTRIC	75-072A	08/09/75	NORMAL	STND	20
		GAMMA-RAY ASTRONOMY SPARK CHAMBER EXPERIMENT (25 - 1000 MEV)			75-072A-01	08/09/75	NORMAL	STND	20
COSMIC BACKGROUND EXPL	SEE COBE								
COSMIC RADIATION SAT B	SEE HAKUCHO								
COSMIC RAY SATELLITE-B	SEE COS-B								
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	AFONIN	FLAT RETARDING POTENTIAL ANALYZER			77-023A-01	03/30/77			21
	AFONIN	HIGH-FREQUENCY ELECTRON TEMPERATURE PROBE			77-023A-02	03/30/77			21
	GDALIEVICH	SPHERICAL ION TRAP WITH FLOATING POTENTIAL			77-023A-03	03/30/77			21
	GDALIEVICH	CYLINDRICAL ELECTROSTATIC PROBE			77-023A-04	03/30/77			21
	GORTCHAKOV	RELATIVISTIC PROTON AND ELECTRON COUNTER			77-023A-08	03/30/77			21
	SCHUTTE	PANORAMIC ELECTROSTATIC SPECTROMETER			77-023A-07	03/30/77			21
	SOSNOVETS	DIFFERENTIAL ENERGY SPECTROMETER			77-023A-05	03/30/77			21
	TELYSOV	DIFFERENTIAL LOW ENERGY SPECTROMETER			77-023A-06	03/30/77			21
	TULUPOV	AURORAL PHOTOMETER			77-023A-09	03/30/77			21
D5-B	BARLIER	FRANCE	CNES 05/17/75	GEOCENTRIC	75-039B	02/18/77	INOPERABLE	ZERO	21
		UPPER ATMOSPHERE DENSITY STUDY USING ON-BOARD ACCELEROMETER			75-039B-01	02/18/79	INOPERABLE	ZERO	22
	BARLIER	MICROMETEORITE STUDY			75-039B-03	02/18/79	INOPERABLE	ZERO	22
DAUGHTER	SEE ISEE 2								
DMSP 12535	SEE DMSP-F1								
DMSP BLOCK 50-1	SEE DMSP-F1								
DMSP-F1	AFGWC STAFF	UNITED STATES	DOD-USAF 09/11/76	GEOCENTRIC	76-091A	07/05/77	NORMAL	STND	22
		OPERATIONAL LINESCAN SYSTEM (OLS)			76-091A-01	02/20/78	PARTIAL	STND	22

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AFGWC STAFF	VERTICAL TEMPERATURE PROFILE RADIOMETER			76-091A-02	08/01/77 INOPERABLE ZERO 22
BLAKE	SPECIAL SENSOR H (SSH)			76-091A-03	INOPERABLE ZERO 23
SHRUM	RADIATION DOSIMETER			76-091A-04	07/05/77 NORMAL STND 23
DMSP-F2	UNITED STATES DOD-USAF	06/05/77	GEOCENTRIC	77-044A	07/19/77 NORMAL STND 23
AFGWC STAFF	OPERATIONAL LINESCAN SYSTEM (OLS)			77-044A-01	10/15/78 PARTIAL STND 23
AFGWC STAFF	VERTICAL TEMPERATURE PROFILE RADIOMETER			77-044A-02	07/19/77 NORMAL STND 24
MIZERA	SPECIAL SENSOR H (SSH)			77-044A-06	07/19/77 NORMAL STND 24
ROTHWELL	REMOTE X-RAY SENSOR - PRECIPITATING			77-044A-03	07/19/77 NORMAL STND 24
SAGALYN	ELECTRONS			77-044A-05	07/19/77 PARTIAL STND 24
SNYDER	PRECIPITATING ELECTRON SPECTROMETER			77-044A-04	07/19/77 PARTIAL STND 24
DMSP-F3	UNITED STATES DOD-USAF	05/01/78	GEOCENTRIC	78-042A	05/01/78 NORMAL STND 24
AFGWC STAFF	OPERATIONAL LINESCAN SYSTEM (OLS)			78-042A-01	05/01/78 PARTIAL STND 25
AFGWC STAFF	VERTICAL TEMPERATURE PROFILE RADIOMETER			78-042A-02	05/01/78 PARTIAL STND 25
ROTHWELL	SPECIAL SENSOR H (SSH)			78-042A-03	01/15/79 INOPERABLE ZERO 25
SHRUM	PRECIPITATING ELECTRON SPECTROMETER			78-042A-04	05/01/78 NORMAL STND 25
DMSP-F4	UNITED STATES DOD-USAF			DMSP-F4	APPROVED MISSION 129
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AFGWC STAFF	VERTICAL TEMPERATURE PROFILE RADIOMETER			DMSP-F4-02	129
AFGWC STAFF	SPECIAL SENSOR H (SSH)			DMSP-F4-06	130
ROTHWELL	SSM/T-MICROWAVE TEMPERATURE SOUNDER			DMSP-F4-03	130
SAGALYN	PRECIPITATING ELECTRON SPECTROMETER			DMSP-F4-05	130
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DMSP-F5	UNITED STATES DOD-USAF			DMSP-F5	APPROVED MISSION 130
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AFGWC STAFF	VERTICAL TEMPERATURE PROFILE RADIOMETER			DMSP-F5-02	131
ROTHWELL	SPECIAL SENSOR H (SSH)			DMSP-F5-03	131
SAGALYN	PRECIPITATING ELECTRON SPECTROMETER			DMSP-F5-05	131
SNYDER	IONOSPHERIC PLASMA MONITOR			DMSP-F5-04	131
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BEGHIN	WAVE FIELD IMPEDANCE			77-029A-11	05/29/79	NORMAL	ZERO	26
GEISS	LOW-ENERGY ION COMPOSITION			77-029A-03	05/29/79	NORMAL	ZERO	26
GENDRIN	MAGNETIC WAVE FIELDS			77-029A-06	05/29/79	NORMAL	ZERO	26
HULTQVIST	LOW-ENERGY ELECTRON AND PROTON PITCH ANGLE DISTRIBUTION			77-029A-04	05/29/79	NORMAL	ZERO	26
MARIANI	TRIAXIAL FLUXGATE MAGNETOMETER			77-029A-09	05/29/79	PARTIAL	ZERO	27
PEDERSEN	DC FIELDS BY DOUBLE PROBE			77-029A-07	05/29/79	NORMAL	ZERO	27
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UNGSTRUP	ELECTRIC WAVE FIELDS			77-029A-10	05/29/79	NORMAL	ZERO	27
WILKEN	ELECTRON AND PROTON PITCH ANGLE DISTRIBUTION			77-029A-01	05/29/79	NORMAL	ZERO	27
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BEGHIN	WAVE FIELD IMPEDANCE			78-071A	08/01/78	NORMAL	STND	28
GEISS	LOW-ENERGY ION COMPOSITION			78-071A-11	08/01/78	NORMAL	STND	28
GENDRIN	MAGNETIC WAVE FIELDS			78-071A-03	08/01/78	NORMAL	STND	28
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MARIANI	TRIAXIAL FLUXGATE MAGNETOMETER			78-071A-04	08/01/78	NORMAL	STND	29
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PETIT	VLF PLASMA RESONANCES			78-071A-07	08/01/78	NORMAL	STND	29
UNGSTRUP	ELECTRIC WAVE FIELDS			78-071A-05	08/01/78	NORMAL	STND	30
WILKEN	ELECTRON AND PROTON PITCH ANGLE DISTRIBUTION			78-071A-10	08/01/78	NORMAL	STND	30
WRENN	THERMAL PLASMA FLOW			78-071A-01	08/01/78	NORMAL	STND	30
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					EPOCH MMDDYY	STATUS	DATA RATE	PAGE NO.
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GEOSARI	SEE ESA-GEOS 2							
GEOSTATION.METEORO.SAT.2	SEE GMS-2							
GEOSTATION.METEOROL.SAT.	SEE GMS							
GLOBAL MAGNETIC SURV MSN	SEE MAGSAT							
GMS	JAPAN UNITED STATES	NASDA NASA-OSTA	07/14/77 GEOCENTRIC	77-065A	08/15/77	NORMAL	STND	32
JMA STAFF	VISIBLE AND INFRARED SPIN-SCAN RADIOMETER (VISSR)			77-065A-01	08/15/77	NORMAL	STND	32
JMA STAFF KOHNO	WEATHER COMMUNICATIONS FACILITY SPACE ENVIRONMENT MONITOR (SEM)			77-065A-03 77-065A-02	08/15/77 08/15/77	NORMAL NORMAL	STND STND	32 32
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JMA STAFF	VISIBLE AND INFRARED SPIN-SCAN RADIOMETER (VISSR)			GMS-2 -03				147
JMA STAFF KOHNO	WEATHER COMMUNICATIONS FACILITY SPACE ENVIRONMENT MONITOR (SEM)			GMS-2 -02				147
GOES 1	UNITED STATES UNITED STATES	NOAA-NESS NASA-OSTA	10/16/75 GEOCENTRIC	75-100A	11/01/78	NORMAL	STND	32
NESS STAFF	VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR)			75-100A-01	03/31/79	PARTIAL	SUBS	33
NESS STAFF	METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM			75-100A-05	11/01/78	NORMAL	STND	33
WILLIAMS	ENERGETIC PARTICLE MONITOR			75-100A-02	06/01/78	PARTIAL	ZERO	33
WILLIAMS	SOLAR X-RAY MONITOR			75-100A-03	06/01/78	NORMAL	ZERO	33
WILLIAMS	MAGNETIC FIELD MONITOR			75-100A-04	06/01/78	PARTIAL	ZERO	33
GOES 2	UNITED STATES UNITED STATES	NOAA-NESS NASA-OSTA	06/16/77 GEOCENTRIC	77-048A	06/16/77	NORMAL	STND	33
NESS STAFF	VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR)			77-048A-01	01/26/79	INOPERABLE	ZERO	34
NESS STAFF	METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM			77-048A-05	08/13/77	NORMAL	STND	34
WILLIAMS	ENERGETIC PARTICLE MONITOR			77-048A-02	07/20/77	NORMAL	STND	34
WILLIAMS	SOLAR X-RAY MONITOR			77-048A-03	07/20/77	NORMAL	STND	34
WILLIAMS	MAGNETIC FIELD MONITOR			77-048A-04	08/17/77	NORMAL	STND	34
GOES 3	UNITED STATES	NOAA-NESS	06/16/78 GEOCENTRIC	78-062A	06/16/78	NORMAL	STND	34
NESS STAFF	VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR)			78-062A-01	07/13/78	NORMAL	STND	35
NESS STAFF	METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM			78-062A-05	07/13/78	NORMAL	STND	35
WILLIAMS	ENERGETIC PARTICLE MONITOR			78-062A-02	07/13/78	NORMAL	STND	35
WILLIAMS	SOLAR X-RAY MONITOR			78-062A-03	07/13/78	NORMAL	STND	35
WILLIAMS	MAGNETIC FIELD MONITOR			78-062A-04	07/13/78	NORMAL	STND	35
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GOES-D	UNITED STATES UNITED STATES	NOAA-NESS NASA-OSTA	08/26/80 GEOCENTRIC	GOES-D		APPROVED MISSION		147
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NESS STAFF	METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM			GOES-D -05				148
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WILLIAMS	SOLAR X-RAY MONITOR			GOES-D -03				148
WILLIAMS	MAGNETIC FIELD MONITOR			GOES-D -04				148
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NESS STAFF	VISIBLE-INFRARED SPIN SCAN RADIOMETER (VISSR)			GOES-E -01				149
NESS STAFF	METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM			GOES-E -05				149
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WILLIAMS	SOLAR X-RAY MONITOR			GOES-E -03				149
WILLIAMS	MAGNETIC FIELD MONITOR			GOES-E -04				149
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NESS STAFF	METEOROLOGICAL DATA COLLECTION AND			GOES-F -05				150

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* * SPACECRAFT NAME ***** *PRINC. INVEST. NAME *	COUNTRY AND AGENCY ***** EXPERIMENT NAME *****	LAUNCH DATE	ORBIT TYPE	* * * * *	NSSDC ID	-----CURRENT STATUS----- EPOCH MNDYY	STATUS	DATA RATE	PAGE NO.
	TRANSMISSIONS SYSTEM								
WILLIAMS	ENERGETIC PARTICLE MONITOR				GOES-F -02				150
WILLIAMS	SOLAR X-RAY MONITOR				GOES-F -03				150
WILLIAMS	MAGNETIC FIELD MONITOR				GOES-F -04				150
GOES-I	SEE GOES 1								
HAKUCHO	JAPAN ISAS	02/21/79	GEOCENTRIC		79-014A	02/21/79	NORMAL	STND	36
MAKINO	DIFFUSE SOFT X-RAYS AND SOFT X-RAY SOURCES				79-014A-02	03/00/79	NORMAL	STND	36
MIYAMOTO	MONITOR OF X-RAY SOURCES				79-014A-01	03/00/79	NORMAL	STND	36
HCM	UNITED STATES NASA-OSTA	04/26/78	GEOCENTRIC		78-041A	04/26/78	NORMAL	STND	36
BARNES	HEAT CAPACITY MAPPING RADIOMETER				78-041A-01	06/01/79	NORMAL	SUBS	36
HEAO 1	UNITED STATES NASA-OSS	08/12/77	GEOCENTRIC		77-075A	01/09/79	INOPERABLE	ZERO	36
BOLDT	COSMIC X-RAY EXPERIMENT				77-075A-02	01/09/79	INOPERABLE	ZERO	37
FRIEDMAN	LARGE AREA COSMIC X-RAY SURVEY				77-075A-01	01/09/79	INOPERABLE	ZERO	37
PETERSON	LOW-ENERGY GAMMA-RAY AND HARD X-RAY SKY SURVEY				77-075A-04	01/09/79	INOPERABLE	ZERO	37
SCHWARTZ	X-RAY SCANNING MODULATION COLLIMATOR				77-075A-03	01/09/79	INOPERABLE	ZERO	37
HEAO 2	UNITED STATES NASA-OSS	11/13/78	GEOCENTRIC		78-103A	11/13/78	NORMAL	STND	38
GIACCONI	MONITOR PROPORTIONAL COUNTER				78-103A-01	11/16/78	NORMAL	STND	38
GIACCONI	HIGH-RESOLUTION IMAGER				78-103A-02	11/17/78	NORMAL	STND	38
GIACCONI	CURVED-CRYSTAL BRAGG X-RAY				78-103A-03	11/16/78	NORMAL	STND	38
GIACCONI	IMAGING PROPORTIONAL COUNTER				78-103A-04	11/16/78	NORMAL	STND	38
GIACCONI	SOLID-STATE X-RAY DETECTOR				78-103A-05	11/16/78	NORMAL	STND	38
HEAO-A	SEE HEAO 1								
HEAO-B	SEE HEAO 2								
HEAO-C	UNITED STATES NASA-OSS	09/14/79	GEOCENTRIC		HEAO-C		APPROVED MISSION		151
ISRAEL	HEAVY NUCLEII				HEAO-C -03				151
JACOBSON	GAMMA-RAY LINE SPECTROMETER				HEAO-C -01				151
KOCH	ISOTOPIIC COMPOSITION OF COSMIC RAYS				HEAO-C -04				151
HEAT CAPACITY MAP MSN	SEE HCM								
HELIOCENTRIC	SEE ISEE 3								
HELIOS 1	SEE HELIOS-A								
HELIOS 2	SEE HELIOS-B								
HELIOS-A	FED REP OF GERMANY BMWF	12/10/74	HELIOCENTRIC		74-097A	12/10/74	NORMAL	STND	39
	UNITED STATES NASA-OSS								
FECHTIG	MICROMETEOROID DETECTOR AND ANALYZER				74-097A-12	12/10/74	NORMAL	STND	39
GURNETT	COARSE FREQUENCY, FINE TIME RESOLUTION SPECTRUM ANALYSIS				74-097A-04	03/10/78	PARTIAL	STND	39
GURNETT	FINE FREQUENCY, COARSE TIME RESOLUTION SPECTRUM ANALYSIS				74-097A-04	03/10/78	PARTIAL	STND	39
GURNETT	50-KHZ TO 2-MHZ RADIO WAVE				74-097A-06	03/10/75	PARTIAL	STND	40
KEPPLER	ENERGETIC ELECTRON DETECTOR				74-097A-10	12/10/74	NORMAL	STND	40
KUNDT	CELESTIAL MECHANICS				74-097A-14	12/10/74	NORMAL	STND	40
KUNOW	COSMIC-RAY PARTICLES				74-097A-07	12/10/74	NORMAL	STND	40
LEINERT	ZODIACAL LIGHT PHOTOMETER				74-097A-11	12/10/74	NORMAL	STND	40
NESS	FLUXGATE MAGNETOMETER FOR AVERAGE FIELDS				74-097A-02	12/10/74	NORMAL	STND	40
NEUBAUER	FLUXGATE MAGNETOMETER FOR FIELD FLUCTUATIONS				74-097A-01	12/10/74	NORMAL	STND	40
NEUBAUER	SEARCH COIL MAGNETOMETER				74-097A-03	12/10/74	NORMAL	STND	41
ROSENBAUER	PLASMA DETECTORS				74-097A-09	12/10/74	NORMAL	STND	41
TRAINER	GALACTIC AND SOLAR COSMIC RAYS				74-097A-08	12/10/74	NORMAL	STND	41
HELIOS-B	FED REP OF GERMANY BMWF	01/15/76	HELIOCENTRIC		76-003A	01/15/76	NORMAL	STND	41
	UNITED STATES NASA-OSS								
FECHTIG	MICROMETEOROID DETECTOR AND ANALYZER				76-003A-12	01/23/76	NORMAL	STND	42
GURNETT	COARSE FREQUENCY, FINE TIME RESOLUTION SPECTRUM ANALYSIS				76-003A-04	01/16/76	NORMAL	STND	42
GURNETT	FINE FREQUENCY, COARSE TIME RESOLUTION SPECTRUM ANALYSIS				76-003A-05	01/16/76	NORMAL	STND	42
GURNETT	50-KHZ TO 2-MHZ RADIO WAVE				76-003A-06	01/16/76	NORMAL	STND	42
KEPPLER	ENERGETIC ELECTRON DETECTOR				76-003A-10	01/16/76	NORMAL	STND	42
KUNDT	CELESTIAL MECHANICS				76-003A-14	01/23/76	NORMAL	STND	43
KUNOW	COSMIC-RAY PARTICLES				76-003A-07	01/16/76	NORMAL	STND	43
LEINERT	ZODIACAL LIGHT PHOTOMETER				76-003A-11	01/23/76	NORMAL	STND	43
NESS	FLUXGATE MAGNETOMETER FOR AVERAGE FIELDS				76-003A-02	01/16/76	NORMAL	STND	43
NEUBAUER	FLUXGATE MAGNETOMETER FOR FIELD FLUCTUATIONS				76-003A-01	01/16/76	NORMAL	STND	43
NEUBAUER	SEARCH COIL MAGNETOMETER				76-003A-03	01/16/76	NORMAL	STND	43
ROSENBAUER	PLASMA DETECTORS				76-003A-09	01/16/76	NORMAL	STND	43

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*PRINC.INVEST.NAME	EXPERIMENT NAME							
TRAINOR	GALACTIC AND SOLAR COSMIC RAYS			76-003A-08	01/16/76	NORMAL	STND	4
KELOS	SEE EXOSAT							
H1.ECCEN LUN OCCULT.SAT.	SEE EXOSAT							
HIGH ENERGY ASTRON OBS-A	SEE HEAO 1							
HIGH ENERGY ASTRON OBS-B	SEE HEAO 2							
HIGH ENERGY ASTRON OBS-C	SEE HEAO-C							
IME-D	SEE ISEE 2							
IME-H	SEE ISEE 3							
IMP 7	SEE IMP-H							
IMP 8	SEE IMP-J							
IMP-H	UNITED STATES NASA-OSS 09/23/72 GEOCENTRIC			72-073A	10/31/78	NORMAL	ZERO	4
BAME	SOLAR PLASMA ELECTROSTATIC ANALYZER			72-073A-10	10/31/78	NORMAL	ZERO	4
BRIDGE	SOLAR PLASMA FARADAY CUP			72-073A-02	10/31/78	PARTIAL	ZERO	4
CLINE	STUDY OF COSMIC-RAY, SOLAR, AND MAGNETOSPHERIC ELECTRONS			72-073A-13	10/31/78	NORMAL	ZERO	4
FRANK	MEASUREMENT OF LOW-ENERGY PROTONS AND ELECTRONS			72-073A-04	10/31/78	NORMAL	ZERO	4
GLOECKLER	IONS AND ELECTRONS IN THE ENERGY RANGE 0.1 TO 2 MEV			72-073A-03	10/31/78	PARTIAL	ZERO	4
KRIMIGIS	CHARGED PARTICLE MEASUREMENTS EXPERIMENT			72-073A-08	10/31/78	PARTIAL	ZERO	4
MCDONALD	SOLAR AND COSMIC-RAY PARTICLES			72-073A-09	10/31/78	NORMAL	ZERO	4
OGILVIE	SOLAR WIND ION COMPOSITION			72-073A-12	10/31/78	NORMAL	ZERO	4
SCARF	PLASMA WAVE			72-073A-11	10/31/78	NORMAL	ZERO	4
SIMPSON	SOLAR FLARE HIGH-Z/LOW-E AND LOW-Z ISOTOPE			72-073A-07	10/31/78	PARTIAL	ZERO	4
STONE	ELECTRONS AND HYDROGEN AND HELIUM ISOTOPES			72-073A-06	10/31/78	NORMAL	ZERO	4
WILLIAMS	ENERGETIC ELECTRONS AND PROTONS			72-073A-05	10/31/78	NORMAL	ZERO	4
IMP-J	UNITED STATES NASA-OSS 10/26/73 GEOCENTRIC			73-078A	10/26/73	NORMAL	STND	4
AGGSON	ELECTROSTATIC FIELDS			73-078A-11	10/26/73	NORMAL	STND	4
BAME	SOLAR PLASMA ELECTROSTATIC ANALYZER			73-078A-10	10/26/73	NORMAL	STND	4
BRIDGE	SOLAR PLASMA FARADAY CUP			73-078A-02	10/26/73	NORMAL	STND	4
FRANK	MEASUREMENT OF LOW-ENERGY PROTONS AND ELECTRONS			73-078A-04	10/26/73	NORMAL	STND	4
GLOECKLER	SOLID-STATE DETECTORS			73-078A-03	12/15/78	PARTIAL	STND	4
GURNEIT	ELECTROMAGNETIC WAVES AND RADIO NOISE			73-078A-12	10/26/73	NORMAL	STND	4
MCNALLY	CHARGED PARTICLE MEASUREMENTS EXPERIMENT			73-078A-08	11/05/73	NORMAL	STND	4
NESS	SOLAR AND COSMIC-RAY PARTICLES			73-078A-09	10/26/73	NORMAL	STND	4
SIMPSON	MAGNETIC FIELD EXPERIMENT			73-078A-01	10/26/73	NORMAL	STND	4
STONE	SOLAR FLARE HIGH-Z/LOW-E AND LOW-Z ISOTOPES			73-078A-07	10/26/73	NORMAL	STND	4
WILLIAMS	ELECTRONS AND HYDROGEN AND HELIUM ISOTOPES			73-078A-06	10/26/73	NORMAL	STND	4
IMP-K	SEE ISEE 1							
IMP-K PRIME	SEE ISEE 2							
INFRA-RED ASTRONOM SAT	SEE IR ASTRON. SAT.							
INT SOLAR POLAR	SEE ISPM/ESA							
INT SOLAR POLAR	SEE ISPM/NASA							
INT ULTRAVIOLET EXPL	SEE IUE							
INTERCOSMOS 18	U.S.S.R. IZMIRAN 10/24/78 GEOCENTRIC			78-099A	10/24/78	NORMAL	STND	4
INTERCOSMOS 19	U.S.S.R. INTERCOS 02/27/79 GEOCENTRIC			79-020A	02/27/79	NORMAL	STND	4
INTNL SUN EARTH EXPL-A	SEE ISEE 1							
INTNL SUN EARTH EXPL-C	SEE ISEE 3							
ION RELEASE MODULE	SEE IRM							
IONO-IK	SEE INTERCOSMOS 19							
IONOSonde-IK	SEE INTERCOSMOS 19							

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IONOSP SOUNDING SAT 2	SEE ISS-B							
IR ASTRON. SAT.	THE NETHERLANDS UNITED STATES UNITED KINGDOM	NIVR NASA-OSS SRC	08/00/81 GEOCENTRIC	IRAS		APPROVED MISSION		151
IRAS	SEE IR ASTRON. SAT.							
IRM	UNITED STATES FED REP OF GERMANY LI AND EU RELEASE MODULE	NASA-OSS MPI	03/00/83 GEOCENTRIC	IRM		PROPOSED MISSION		152
HAERENDEL				IRM -01				152
ISEE 1	UNITED STATES	NASA-OSS	10/22/77 GEOCENTRIC	77-102A	10/22/77	NORMAL	STND	49
ANDERSON	ELECTRONS AND PROTONS			77-102A-10	10/22/77	NORMAL	STND	49
BAME	FAST PLASMA AND SOLAR WIND IONS			77-102A-01	10/22/77	NORMAL	STND	49
CLINE	GAMMA-RAY BURSTS			77-102A-14	10/22/77	NORMAL	STND	50
FRANK	HOT PLASMA			77-102A-03	10/22/77	NORMAL	STND	50
GURNETT	PLASMA WAVES			77-102A-07	10/22/77	NORMAL	STND	50
HARVEY	PLASMA DENSITY			77-102A-08	10/22/77	NORMAL	STND	50
HELLIWELL	VLF WAVE PROPAGATION			77-102A-13	10/22/77	NORMAL	STND	50
HEPPNER	DC ELECTRIC FIELD			77-102A-11	10/22/77	NORMAL	STND	50
HOVESTADT	LOW-ENERGY COSMIC RAYS			77-102A-05	08/07/78	PARTIAL	STND	51
MOZER	QUASI-STATIC ELECTRIC FIELDS			77-102A-06	10/22/77	NORMAL	STND	51
OGILVIE	FAST ELECTRONS			77-102A-02	10/22/77	NORMAL	STND	51
RUSSELL	FLUXGATE MAGNETOMETER			77-102A-04	10/22/77	NORMAL	STND	51
SHARP	ION COMPOSITION			77-102A-12	04/13/78	PARTIAL	STND	51
WILLIAMS	ENERGETIC ELECTRONS AND PROTONS			77-102A-09	10/22/77	NORMAL	STND	52
ISEE 2	INTERNATIONAL UNITED STATES	ESA NASA-OSS	10/22/77 GEOCENTRIC	77-102B	10/22/77	NORMAL	STND	52
ANDERSON	ELECTRONS AND PROTONS			77-102B-08	05/01/79	PARTIAL	STND	52
FRANK	HOT PLASMA			77-102B-03	01/10/78	PARTIAL	STND	52
GURNETT	PLASMA WAVES			77-102B-05	10/22/77	NORMAL	STND	52
HARVEY	RADIO PROPAGATION			77-102B-06	10/22/77	NORMAL	STND	53
KEPLER	ENERGETIC ELECTRONS AND PROTONS			77-102B-07	10/22/77	NORMAL	STND	53
MORENO	SOLAR WIND IONS			77-102B-02	10/22/77	NORMAL	STND	53
PASCHMANN	FAST PLASMA			77-102B-01	10/22/77	NORMAL	STND	53
RUSSELL	FLUXGATE MAGNETOMETER			77-102B-04	10/22/77	NORMAL	STND	53
ISEE 3	UNITED STATES	NASA-OSS	08/12/78 HELIOCENTRIC	78-079A	08/12/78	NORMAL	STND	53
ANDERSON	INTERPLANETARY AND SOLAR ELECTRONS			78-079A-09	08/15/78	NORMAL	STND	54
ANDERSON	X- AND GAMMA-RAY BURSTS			78-079A-14	08/15/78	NORMAL	STND	54
BAME	SOLAR WIND PLASMA			78-079A-01	08/16/78	NORMAL	STND	54
HECKMAN	HIGH-ENERGY COSMIC RAY			78-079A-05	08/15/78	NORMAL	STND	54
HOVESTADT	LOW-ENERGY COSMIC RAYS			78-079A-03	08/15/78	NORMAL	STND	54
HYNDS	ENERGETIC PROTONS			78-079A-08	08/15/78	NORMAL	STND	55
MEYER	COSMIC-RAY ELECTRONS AND NUCLEI			78-079A-06	08/15/78	NORMAL	STND	55
OGILVIE	SOLAR WIND ION COMPOSITION			78-079A-11	08/18/78	NORMAL	STND	55
SCARF	PLASMA WAVES			78-079A-07	08/12/78	NORMAL	STND	55
SMITH	MAGNETIC FIELDS			78-079A-02	08/12/78	NORMAL	STND	55
STEINBERG	RADIO MAPPING			78-079A-10	08/13/78	NORMAL	STND	55
STONE	HIGH-ENERGY COSMIC RAYS			78-079A-12	01/15/79	PARTIAL	STND	55
TEEGARDEN	GAMMA-RAY BURSTS			78-079A-15	01/15/79	PARTIAL	STND	56
VON ROSENFINKE	MEDIUM ENERGY COSMIC RAY			78-079A-04	08/15/78	NORMAL	STND	56
WILCOX	GROUND BASED SOLAR STUDIES			78-079A-13	NA	NA	NA	56
ISEE-A	SEE ISEE 1							
ISEE-B	SEE ISEE 2							
ISEE-C	SEE ISEE 3							
ISIS 1	CANADA UNITED STATES	CRC NASA-OSS	01/30/69 GEOCENTRIC	69-009A	01/30/70	PARTIAL	SUBS	56
BARRINGTON	VLF RECEIVER			69-009A-03	01/30/70	NORMAL	SUBS	56
BRACE	CYLINDRICAL ELECTROSTATIC PROBE			69-009A-07	01/30/70	NORMAL	SUBS	57
CALVERT	FIXED-FREQUENCY SOUNDER			69-009A-02	01/30/70	NORMAL	SUBS	57
HARTZ	COSMIC RADIO NOISE			69-009A-10	01/30/70	NORMAL	SUBS	57
MCDIARMID	ENERGETIC PARTICLE DETECTORS			69-009A-04	01/30/70	NORMAL	SUBS	57
SAGALYN	SPHERICAL ELECTROSTATIC ANALYZER			69-009A-08	01/30/70	NORMAL	SUBS	57
WHITTEKER	SWEEP-FREQUENCY SOUNDER			69-009A-01	01/30/70	NORMAL	SUBS	57
ISIS 2	CANADA UNITED STATES	CRC NASA-OSS	04/01/71 GEOCENTRIC	71-024A	02/04/73	PARTIAL	SUBS	58
ANGER	3914- AND 5577-A PHOTOMETER			71-024A-11	02/04/73	NORMAL	SUBS	58
BARRINGTON	VLF RECEIVER			71-024A-03	02/04/73	NORMAL	SUBS	58
CALVERT	FIXED-FREQUENCY SOUNDER			71-024A-02	02/04/73	NORMAL	SUBS	58
HARTZ	COSMIC RADIO NOISE			71-024A-10	02/04/73	NORMAL	SUBS	59
HOFFMAN	ION-MASS SPECTROMETER			71-024A-06	02/04/73	NORMAL	SUBS	59
MAIER	RETARDING POTENTIAL ANALYZER			71-024A-08	02/04/73	NORMAL	SUBS	59
MCDIARMID	ENERGETIC PARTICLE DETECTORS			71-024A-04	02/04/73	PARTIAL	SUBS	59
SHEPHERD	6300-A PHOTOMETER			71-024A-12	02/04/73	NORMAL	SUBS	59

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WHITTEKER	SWEEP-FREQUENCY SOUNDER			71-024A-01	02/04/73	NORMAL	SUBS	60
ISIS-A	SEE ISIS 1							
ISIS-B	SEE ISIS 2							
ISP	SEE ISPM/ESA							
ISP	SEE ISPM/NASA							
ISPM	SEE ISPM/ESA							
ISPM	SEE ISPM/NASA							
ISPM/ESA	INTERNATIONAL ESA	02/03/83	HELIOCENTRIC	ISPESA		APPROVED MISSION		152
BAME	PLASMA SPECTROMETER			ISPESA -05				152
ESPOSITO	RADIO SCIENCE			ISPESA -09				152
GLOECKLER	SOLAR-WIND COMPOSITION SPECTROMETER			ISPESA -04				153
GRUN	COSMIC DUST			ISPESA -07				153
HEDGECOCK	MAGNETIC FIELD			ISPESA -08				153
HURLEY	SOLAR-FLARE X-RAYS AND COSMIC GAMMA RAY BURST			ISPESA -01				153
LANZEROTTI	HELIOSPHERE			ISPESA -03				153
SIMPSON	COSMIC RAY AND CHARGED PARTICLE			ISPESA -02				153
STONE	UNIFIED RADIO AND PLASMA WAVE			ISPESA -06				154
ISPM/NASA	UNITED STATES NASA-OSS	02/03/83	HELIOCENTRIC	ISPNASA		APPROVED MISSION		154
ACUNA	MAGNETIC FIELD (MAG)			ISPNASA-06				154
CLINE	SOLAR X-RAY FLARE AND COSMIC-RAY BURST (SKR)			ISPNASA-02				154
GIESE	ZODIACAL LIGHT/BACKGROUND STARLIGHT (ZLE)			ISPNASA-08				154
MACQUEEN	WHITE-LIGHT CORONAGRAPH/X-RAY XUV TELESCOPE (CXX)			ISPNASA-01				154
ROSENBAUER	MASS SEPARATING SOLAR WIND (SWE)			ISPNASA-04				155
ROSENBAUER	DIRECT MEASUREMENT OF INTERSTELLAR GAS USING HE AS TRACER (NGM)			ISPNASA-07				155
STONE	COMPREHENSIVE PARTICLE ANALYSIS SYSTEM (CPA)			ISPNASA-03				155
STONE	ELECTROMAGNETIC SURVEY AND UNIFIED RADIO AND PLASMA WAVE (RAE)			ISPNASA-05				155
ISS-2	SEE ISS-B							
ISS-B	JAPAN RRL	02/16/78	GEOCENTRIC	78-018A	02/16/78	NORMAL	STND	60
IWAMOTO	ION MASS SPECTROMETER			78-018A-04	02/27/78	NORMAL	STND	60
KOTAKI	RADIO NOISE NEAR 2.5, 5, 10, AND 25 MHZ			78-018A-02	02/27/78	NORMAL	STND	60
MATUURA	SWEEP FREQUENCY TOPSIDE IONOSPHERIC SOUNDER (TOP)			78-018A-01	02/27/78	NORMAL	STND	60
MORI	RETARDING POTENTIAL TRAP			78-018A-03	02/27/78	NORMAL	STND	61
ITOS-G	SEE NOAA 4							
ITOS-H	SEE NOAA 5							
IUE	UNITED STATES NASA-OSS	01/26/78	GEOCENTRIC	78-012A	01/26/78	NORMAL	STND	61
	INTERNATIONAL ESA							
	UNITED KINGDOM SRC							
GUEST INVESTIGATORS	LOW-/HIGH-RESOLUTION, ULTRAVIOLET SPECTROGRAPH PACKAGE			78-012A-01	01/26/78	NORMAL	STND	61
NONE ASSIGNED	PARTICLE FLUX MONITOR (SPACECRAFT)			78-012A-02	01/26/78	NORMAL	STND	61
JIKIKEN	JAPAN ISAS	09/16/78	GEOCENTRIC	78-087A	09/16/78	NORMAL	STND	61
AOYAMA	FLUXGATE MAGNETOMETER (MGF)			78-087A-05	09/23/78	NORMAL	STND	62
EJIRI	IMPEDANCE AND ELECTRIC FIELD (IEF)			78-087A-04	09/25/78	NORMAL	STND	62
KAWASHIMA	CONTROLLED ELECTRON BEAM EMISSIONS (CBE)			78-087A-07	09/23/78	NORMAL	STND	62
KIMURA	VLF DOPPLER PROPAGATION (DPL)			78-087A-03	09/23/78	NORMAL	STND	62
KUBO	ENERGY SPECTRUM OF PARTICLES (ESP)			78-087A-06	09/23/78	NORMAL	STND	62
OYA	STIMULATED PLASMA WAVE (SPW)			78-087A-01	09/25/78	NORMAL	STND	62
OYA	NATURAL PLASMA WAVES (NPW)			78-087A-02	09/25/78	NORMAL	STND	63
JOP	SEE GALILEO PROBE							
JOP	SEE GALILEO ORBITER							
JUPITER ORBITER PROBE	SEE GALILEO PROBE							
JUPITER ORBITER PROBE	SEE GALILEO ORBITER							
KYOKKO	JAPAN ISAS	02/04/78	GEOCENTRIC	78-014A	02/04/78	NORMAL	STND	63
IWAMOTO	ION MASS SPECTROMETER			78-014A-06	02/26/78	NORMAL	STND	63
KANEDA	UV AURORAL TV IMAGING			78-014A-03	02/24/78	NORMAL	STND	63

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MUKAI	ELECTRON ENERGY ANALYZER			78-014A-02	02/23/78	NORMAL	STND	63
NAKAMURA	UV GLOW SPECTROPHOTOMETER			78-014A-05	02/28/78	NORMAL	STND	63
OYAMA	ELECTRON PROBES			78-014A-01	02/25/78	NORMAL	STND	63
YOSHINO	ELECTROSTATIC PLASMA WAVE MEASUREMENT			78-014A-04	02/23/78	NORMAL	STND	64
LAND SATELLITE-D1	SEE LANDSAT-D							
LANDSAT 2	UNITED STATES NASA-OSTA	01/22/75	GEOCENTRIC	75-004A	01/22/75	NORMAL	STND	64
BALLA	MULTISPECTRAL SCANNER (MSS)			75-004A-02	01/27/75	NORMAL	STND	64
LANDSAT 3	UNITED STATES NASA-OSTA	03/05/78	GEOCENTRIC	78-026A	03/05/78	NORMAL	STND	64
BALLA	MULTISPECTRAL SCANNER (MSS)			78-026A-02	07/11/78	PARTIAL	STND	65
GILBERT	DATA COLLECTION SYSTEM (DCS)			78-026A-03	03/05/78	NORMAL	STND	65
WILSON	RETURN BEAM VIDICON CAMERA (RBV)			78-026A-01	03/05/78	NORMAL	STND	65
LANDSAT-D	UNITED STATES NASA-OSTA	09/00/81	GEOCENTRIC	LAND-D		APPROVED MISSION		155
RANGO	THEMATIC MAPPER			LAND-D -01				156
LANDSAT-D1	SEE LANDSAT-D							
LARGE SPACE TELESCOPE	SEE ST							
LDEF	SEE SPACE SHUTTLE LDEF-A							
LFO-A	SEE LANDSAT-D							
LONG DURATION EXPOS.FAC.	SEE SPACE SHUTTLE LDEF-A							
MAG-1K	SEE INTERCOSMOS 18							
MAGIC	SEE INTERCOSMOS 18							
MAGION	U.S.S.R. INTERCOS	10/24/78	GEOCENTRIC	78-099C	11/14/78	NORMAL	STND	65
	CZECHOSLOVAKIA UNKNOWN							
MAGSAT	UNITED STATES NASA-OSTA	10/18/79	GEOCENTRIC	AEM-C		APPROVED MISSION		156
LANGEL	SCALAR MAGNETOMETER			AEM-C -01				156
LANGEL	VECTOR MAGNETOMETER			AEM-C -02				156
MAGSAT-A	SEE MAGSAT							
MARINER 77A	SEE VOYAGER 1							
MARINER 77B	SEE VOYAGER 2							
MARINER JUPITER/SATURN A	SEE VOYAGER 1							
MARINER JUPITER/SATURN B	SEE VOYAGER 2							
ME01	SEE SMS 1							
ME02	SEE SMS 2							
METEOROLOGICAL SAT-A	SEE METEOSAT 1							
METEOSAT 1	INTERNATIONAL ESA	11/23/77	GEOCENTRIC	77-108A	11/23/77	NORMAL	STND	65
ESA STAFF	UNITED STATES NASA-OSTA			77-108A-01	11/23/77	NORMAL	STND	66
ESA STAFF	IMAGING RADIOMETER			77-108A-02	11/23/77	NORMAL	STND	66
	DATA COLLECTION PLATFORM (DCP)							
MJS 77A	SEE VOYAGER 1							
MJS 77B	SEE VOYAGER 2							
MOTHER	SEE ISEE 1							
NIMBUS 4	UNITED STATES NASA-OSTA	04/08/70	GEOCENTRIC	70-025A	01/00/78	PARTIAL	STND	66
HEATH	BACKSCATTER ULTRAVIOLET (BUV)			70-025A-05	01/00/78	PARTIAL	SUBS	66
	SPECTROMETER							
NIMBUS 5	UNITED STATES NASA-OSTA	12/11/72	GEOCENTRIC	72-097A	01/04/73	PARTIAL	STND	67
HOUGHTON	SELECTIVE CHOPPER RADIOMETER (SCR)			72-097A-02	07/15/75	NORMAL	SUBS	67
STAELIN	MICROWAVE SPECTROMETER (NEMS)			72-097A-03	08/00/77	INOPERABLE	ZERO	67
WILHEIT, JR.	ELECTRICALLY SCANNING MICROWAVE			72-097A-04	08/15/77	PARTIAL	SUBS	67
	RADIOMETER (ESMR)							
NIMBUS 6	UNITED STATES NASA-OSTA	06/12/75	GEOCENTRIC	75-052A	01/00/76	PARTIAL	STND	67
HOUGHTON	PRESSURE-MODULATED RADIOMETER (PMR)			75-052A-09	08/04/76	NORMAL	SUBS	68
JACOBOWITZ	EARTH RADIATION BUDGET (ERB)			75-052A-05	06/06/79	PARTIAL	SUBS	68
JULIAN	TROPICAL WIND ENERGY CONVERSION AND			75-052A-01	06/19/75	NORMAL	STND	68
	REFERENCE LEVEL (TWERLE)							

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* SPACECRAFT NAME	COUNTRY AND AGENCY	LAUNCH DATE	ORBIT TYPE	* NSSDC ID	EPCH MDDYY	STATUS	DATA RATE	PAGE NO.
*PRINC.INVEST.NAME	EXPERIMENT NAME							
NIMBUS 7	UNITED STATES	NASA-OSTA	10/24/78 GEOCENTRIC	78-098A	10/24/78	NORMAL	STND	69
ALLISON	TEMPERATURE/HUMIDITY INFRARED RADIOMETER (THIR)			78-098A-10	10/24/78	NORMAL	STND	69
GLOERSEN	SCANNING MULTISPECTRAL MICROWAVE RADIOMETER (SMR)			78-098A-08	10/24/78	NORMAL	STND	69
HEATH	SOLAR AND BACKSCATTER ULTRAVIOLET/TOTAL OZONE MAPPING SYSTEM (SBUV/TOMS)			78-098A-09	10/24/78	NORMAL	STND	69
HOUGHTON	STRATOSPHERIC AND MESOSPHERIC SOUNDER (SAMS)			78-098A-02	11/15/78	NORMAL	STND	70
HOVIS	COASTAL ZONE COLOR SCANNER			78-098A-03	10/29/78	NORMAL	STND	70
JACOBOWITZ	EARTH RADIATION BUDGET (ERB)			78-098A-07	11/15/78	NORMAL	STND	70
MCCORMICK	STRATOSPHERIC AEROSOL MEASUREMENT-II (SAM-II)			78-098A-06	10/24/78	NORMAL	STND	70
RUSSELL, 3RD	LIMB INFRARED MONITOR OF THE STRATOSPHERE (LIMS)			78-098A-01	06/05/79	INOPERABLE	ZERO	71
NIMBUS-D	SEE NIMBUS 4							
NIMBUS-E	SEE NIMBUS 5							
NIMBUS-F	SEE NIMBUS 6							
NIMBUS-G	SEE NIMBUS 7							
NOAA 4	UNITED STATES	NOAA-NESS	11/15/74 GEOCENTRIC	74-089A	11/18/78	INOPERABLE	ZERO	71
NESS STAFF	UNITED STATES	NASA-OSTA		74-089A-02	08/06/78	INOPERABLE	ZERO	71
WILLIAMS	SCANNING RADIOMETER (SR)			74-089A-01	11/18/78	INOPERABLE	ZERO	71
NOAA 5	UNITED STATES	NOAA-NESS	07/29/76 GEOCENTRIC	76-077A	03/01/79	PARTIAL	ZERO	71
NESS STAFF	UNITED STATES	NASA-OSTA		76-077A-01	03/01/79	NORMAL	ZERO	72
NESS STAFF	VERY HIGH RESOLUTION RADIOMETER (VHRR)			76-077A-C2	03/01/79	NORMAL	ZERO	72
NESS STAFF	VERTICAL TEMPERATURE PROFILE RADIOMETER (VTPR)			76-077A-03	03/01/79	PARTIAL	ZERO	72
WILLIAMS	SCANNING RADIOMETER (SR)			76-077A-04	03/01/79	NORMAL	ZERO	72
NOAA 6	UNITED STATES	NOAA-NESS	06/27/79 GEOCENTRIC	79-057A	06/27/79	NORMAL	STND	72
NESS STAFF	UNITED STATES	NASA-OSTA		79-057A-01	06/27/79	NORMAL	STND	73
NESS STAFF	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)			79-057A-02	06/27/79	NORMAL	STND	73
NESS STAFF	OPERATIONAL VERTICAL SOUNDER			79-057A-03	06/27/79	NORMAL	STND	73
WILLIAMS	DATA COLLECTION SYSTEM			79-057A-04	06/27/79	NORMAL	STND	73
NOAA-A	SEE NOAA 6							
NOAA-B	UNITED STATES	NOAA-NESS	11/01/79 GEOCENTRIC	NOAA-B		APPROVED MISSION		156
NESS STAFF	UNITED STATES	NASA-OSTA		NOAA-B -01				156
NESS STAFF	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)			NOAA-B -02				157
NESS STAFF	OPERATIONAL VERTICAL SOUNDER			NOAA-B -03				157
WILLIAMS	DATA COLLECTION SYSTEM (DCS)			NOAA-B -04				157
NOAA-C	UNITED STATES	NOAA-NESS	02/01/80 GEOCENTRIC	NOAA-C		APPROVED MISSION		157
NESS STAFF	UNITED STATES	NASA-OSTA		NOAA-C -01				157
NESS STAFF	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)			NOAA-C -02				158
NESS STAFF	OPERATIONAL VERTICAL SOUNDER			NOAA-C -03				158
WILLIAMS	DATA COLLECTION SYSTEM (DCS)			NOAA-C -04				158
NOAA-D	UNITED STATES	NOAA-NESS	08/01/81 GEOCENTRIC	NOAA-D		APPROVED MISSION		158
NESS STAFF	UNITED STATES	NASA-OSTA		NOAA-D -01				158
NESS STAFF	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)			NOAA-D -02				159
NESS STAFF	OPERATIONAL VERTICAL SOUNDER			NOAA-D -03				159
WILLIAMS	DATA COLLECTION SYSTEM (DCS)			NOAA-D -04				159
NOAA-E	UNITED STATES	NOAA-NESS	02/01/82 GEOCENTRIC	NOAA-E		APPROVED MISSION		159
NESS STAFF	UNITED STATES	NASA-OSTA		NOAA-E -01				159
NESS STAFF	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)			NOAA-E -02				160
NESS STAFF	OPERATIONAL VERTICAL SOUNDER			NOAA-E -03				160
WILLIAMS	DATA COLLECTION SYSTEM (DCS)			NOAA-E -04				160
NOAA-F	UNITED STATES	NOAA-NESS	05/01/83 GEOCENTRIC	NOAA-F		APPROVED MISSION		160
BROOME	UNITED STATES	NASA-OSTA		NOAA-F -05				160
	EARTH RADIATION BUDGET INSTRUMENT (ERBI)							

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	NESS STAFF	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)				NOAA-F -01				161
	NESS STAFF	OPERATIONAL VERTICAL SOUNDER				NOAA-F -02				161
	NESS STAFF	DATA COLLECTION SYSTEM (DCS)				NOAA-F -03				161
	WILLIAMS	SPACE ENVIRONMENT MONITOR				NOAA-F -04				161
NOAA-G		UNITED STATES	NOAA-NESS 02/00/84	GEOCENTRIC		NOAA-G		APPROVED MISSION		161
	BROOME	UNITED STATES	NASA-OSTA							
	NESS STAFF	EARTH RADIATION BUDGET INSTRUMENT (ERBI)				NOAA-G -05				162
		ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)				NOAA-G -01				162
	NESS STAFF	OPERATIONAL VERTICAL SOUNDER				NOAA-G -02				162
	NESS STAFF	DATA COLLECTION SYSTEM (DCS)				NOAA-G -03				162
	WILLIAMS	SPACE ENVIRONMENT MONITOR				NOAA-G -04				162
QAO 3		UNITED STATES	NASA-OSS 08/21/72	GEOCENTRIC		72-065A	08/21/72	NORMAL	STND	73
	BOYD	STELLAR X-RAYS				72-065A-02	06/00/73	PARTIAL	STND	74
	SPITZER	HIGH-RESOLUTION TELESCOPES				72-065A-01	08/21/72	NORMAL	STND	74
QAO-C		SEE QAO 3								
OCEAN DYNAMICS SAT-A		SEE SEASAT 1								
OSO 8		UNITED STATES	NASA-OSS 06/21/75	GEOCENTRIC		75-057A	10/30/78	INOPERABLE	ZERO	74
	ACTON	MAPPING X-RAY HELIOMETER				75-057A-04	10/15/78	INOPERABLE	ZERO	74
	BARTH	HIGH-RESOLUTION ULTRAVIOLET SPECTROMETER MEASUREMENTS				75-057A-01	10/15/78	INOPERABLE	ZERO	74
	BONNET	CHROMOSPHERE FINE-STRUCTURE STUDY				75-057A-02	10/15/78	INOPERABLE	ZERO	75
	FROST	HIGH-ENERGY CELESTIAL X RAYS				75-057A-07	10/15/78	INOPERABLE	ZERO	75
	KRAUSHAAR	SOFT X-RAY BACKGROUND RADIATION INVESTIGATION				75-057A-05	10/15/78	INOPERABLE	ZERO	75
	NOVICK	HIGH-SENSITIVITY CRYSTAL SPECTROSCOPY OF STELLAR AND SOLAR X RAYS				75-057A-03	10/15/78	INOPERABLE	ZERO	75
	SERLEMITOS	COSMIC X-RAY SPECTROSCOPY				75-057A-06	10/15/78	INOPERABLE	ZERO	75
	WELLER, JR.	EUV FROM EARTH AND SPACE				75-057A-08	10/15/78	INOPERABLE	ZERO	75
OSO-EYE		SEE OSO 8								
OSO-I		SEE OSO 8								
OSS-1		UNITED STATES	NASA-OSS 02/14/81	GEOCENTRIC		SHOFT-4		APPROVED MISSION		163
	BANKS	VEHICLE CHARGING AND POTENTIAL EXPERIMENT				SHOFT-4-04				163
	BRUECKNER	SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR				SHOFT-4-03				163
	COWLES	INFLUENCE OF WEIGHTLESSNESS OF LIGNIFICATION OF PLANT SEEDLINGS				SHOFT-4-07				163
	NOVICK	SOLAR FLARE X-RAY POLARIMETER EXPERIMENT				SHOFT-4-02				163
	OLLENDORF	THERMAL CANISTER EXPERIMENT				SHOFT-4-05				164
	SHAWHAN	PLASMA DIAGNOSTIC PACKAGE				SHOFT-4-01				164
	WEINBERG	CHARACTERISTICS OF SHUTTLE/SPACELAB INDUCED ATMOSPHERE				SHOFT-4-06				164
OUTER PLANETS A		SEE VOYAGER 1								
OUTER PLANETS B		SEE VOYAGER 2								
OVAL		SEE COSMOS 900								
P78-1		SEE STP P78-1								
P78-2		SEE STP P78-2								
P80-1		SEE STP P80-1								
P80-2		SEE STP P80-2								
PIONEER 6		UNITED STATES	NASA-OSS 12/16/65	HELIOCENTRIC		65-105A	02/07/71	NORMAL	SUBS	76
	ANDERSON	CELESTIAL MECHANICS				65-105A-07	12/16/65	NORMAL	STND	76
	ANDERSON	RELATIVITY INVESTIGATION				65-105A-10	12/16/65	NORMAL	STND	76
	BRIDGE	SOLAR WIND PLASMA FARADAY CUP				65-105A-02	12/03/74	PARTIAL	SUBS	76
	FAN	COSMIC-RAY TELESCOPE				65-105A-03	12/03/74	NORMAL	SUBS	76
	GOLDSTEIN	SPECTRAL BROADENING				65-105A-09	12/16/65	NORMAL	STND	76
	MCCRACKEN	COSMIC-RAY ANISOTROPY				65-105A-05	12/03/74	PARTIAL	SUBS	77
	WOLFE	ELECTROSTATIC ANALYZER				65-105A-06	12/03/74	NORMAL	SUBS	77
PIONEER 9		UNITED STATES	NASA-OSS 11/08/68	HELIOCENTRIC		68-100A	05/19/69	NORMAL	SUBS	77
	ANDERSON	CELESTIAL MECHANICS				68-100A-08	11/08/68	NORMAL	STND	78
	BERG	COSMIC DUST DETECTOR				68-100A-04	05/19/69	NORMAL	SUBS	78
	ESHLEMAN	TWO-FREQUENCY BEACON RECEIVER				68-100A-03	12/03/74	NORMAL	SUBS	78
	MCCRACKEN	COSMIC-RAY ANISOTROPY				68-100A-05	05/19/69	NORMAL	SUBS	78
	SCARF	PLASMA WAVE DETECTOR				68-100A-07	05/19/69	NORMAL	SUBS	78

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* * *****	SPACECRAFT NAME *PRINC.INVEST.NAME *	COUNTRY AND AGENCY EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	* * *****	NSSDC ID	-----CURRENT STATUS----- EPOCH MMDDYY	STATUS	DATA RATE	PAGE NO.
PIONEER	VENUS PROBE LRG	UNITED STATES	NASA-OSS	08/08/78	VENUS PROBE	78-078D	12/09/78	INOPERABLE	ZERO	90
	BOESE	INFRARED RADIOMETER				78-078D-05	12/09/78	INOPERABLE	ZERO	90
	COUNSELMAN	DIFFERENTIAL VERY LONG-BASELINE INTERFEROMETRIC TRACKING				78-078D-09	12/09/78	INOPERABLE	ZERO	90
	HOFFMAN	NEUTRAL PARTICLE MASS SPECTROMETER				78-078D-06	12/09/78	INOPERABLE	ZERO	90
	KNOLLENBERG	CLOUD PARTICLE SIZE SPECTROMETER				78-078D-03	12/09/78	INOPERABLE	ZERO	90
	OYAMA	GAS CHROMATOGRAPH				78-078D-04	12/09/78	INOPERABLE	ZERO	90
	RAGENT	CLOUD EXTENT, STRUCTURE, AND DISTRIBUTION				78-078D-02	12/09/78	INOPERABLE	ZERO	90
	SEIFF	ATMOSPHERE STRUCTURE				78-078D-01	12/09/78	INOPERABLE	ZERO	91
	TOMASKO	SOLAR ENERGY PENETRATION INTO THE ATMOSPHERE				78-078D-07	12/09/78	INOPERABLE	ZERO	91
PIONEER	VENUS PROBE SM1	UNITED STATES	NASA-OSS	08/08/78	VENUS PROBE	78-078E	12/09/78	INOPERABLE	ZERO	91
	COUNSELMAN	DIFFERENTIAL VERY LONG-BASELINE INTERFEROMETRIC TRACKING				78-078E-03	12/09/78	INOPERABLE	ZERO	91
	RAGENT	CLOUD EXTENT, STRUCTURE, AND DISTRIBUTION				78-078E-02	12/09/78	INOPERABLE	ZERO	91
	SEIFF	ATMOSPHERE STRUCTURE				78-078E-01	12/09/78	INOPERABLE	ZERO	91
	SUOMI	INFRARED RADIOMETER				78-078E-04	12/09/78	INOPERABLE	ZERO	92
PIONEER	VENUS PROBE SM2	UNITED STATES	NASA-OSS	08/08/78	VENUS PROBE	78-078F	12/09/78	INOPERABLE	ZERO	92
	COUNSELMAN	DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRIC TRACKING				78-078F-03	12/09/78	INOPERABLE	ZERO	92
	RAGENT	CLOUD EXTENT, STRUCTURE, AND DISTRIBUTION				78-078F-02	12/09/78	INOPERABLE	ZERO	92
	SEIFF	ATMOSPHERE STRUCTURE				78-078F-01	12/09/78	INOPERABLE	ZERO	92
	SUOMI	INFRARED RADIOMETER				78-078F-04	12/09/78	INOPERABLE	ZERO	92
PIONEER	VENUS PROBE SM3	UNITED STATES	NASA-OSS	08/08/78	VENUS PROBE	78-078G	12/09/78	INOPERABLE	ZERO	93
	COUNSELMAN	DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRIC TRACKING				78-078G-03	12/09/78	INOPERABLE	ZERO	93
	RAGENT	CLOUD EXTENT, STRUCTURE, AND DISTRIBUTION				78-078G-02	12/09/78	INOPERABLE	ZERO	93
	SEIFF	ATMOSPHERE STRUCTURE				78-078G-01	12/09/78	INOPERABLE	ZERO	93
	SUOMI	INFRARED RADIOMETER				78-078G-04	12/09/78	INOPERABLE	ZERO	93
PIONEER-A		SEE PIONEER 6								
PIONEER-D		SEE PIONEER 9								
PIONEER-F		SEE PIONEER 10								
PIONEER-G		SEE PIONEER 11								
PROGNOZ 6		U.S.S.R.	SAS	09/22/77	GEOCENTRIC	77-093A	09/00/78	INOPERABLE	ZERO	93
	EROSHENKO	THREE-AXIS FLUXGATE MAGNETOMETER				77-093A-01	09/00/78	INOPERABLE	ZERO	94
	ESTULIN	GAMMA-RAY SPECTROMETER				77-093A-05	09/00/78	INOPERABLE	ZERO	94
	GRINGAUZ	PLASMA DETECTOR				77-093A-02	09/00/78	INOPERABLE	ZERO	94
	KACHAROV	SOLAR X-RAYS				77-093A-03	09/00/78	INOPERABLE	ZERO	94
	KURT	INTERPLANETARY UV EMISSION PHOTOMETER - HYDROGEN AND HELIUM				77-093A-08	09/00/78	INOPERABLE	ZERO	94
	LICKIN	SOLAR X-RAY SPECTROMETER				77-093A-07	09/00/78	INOPERABLE	ZERO	94
	LOGACHEV	ELECTRON AND PROTON SPECTROMETER				77-093A-04	09/00/78	INOPERABLE	ZERO	94
	LUTSENKO	ENERGETIC PARTICLES CHARGE AND MASS COMPOSITION				77-093A-11	09/00/78	INOPERABLE	ZERO	94
	PISARENKO	ENERGETIC ELECTRON AND PROTON SPECTROMETER				77-093A-09	09/00/78	INOPERABLE	ZERO	94
	SEVERNY	UV EMISSION SPECTROMETER				77-093A-10	09/00/78	INOPERABLE	ZERO	95
	SKREBTSOV	PROTON AND HEAVY NUCLEI SPECTROMETER				77-093A-06	09/00/78	INOPERABLE	ZERO	95
PROGNOZ 7		U.S.S.R.	UNKNOWN	10/30/78	GEOCENTRIC	78-101A	10/30/78	NORMAL	STND	95
	ESTULIN	GAMMA-RAY SPECTROMETER				78-101A-03	10/30/78	NORMAL	STND	95
	HULTQVIST	MAGNETOSPHERIC ION COMPOSITION SPECTROMETER				78-101A-02	10/30/78	NORMAL	STND	95
	VAISBERG	SELECTIVE COMBINED PLASMA SPECTROMETER (SCS)				78-101A-01	10/30/78	NORMAL	STND	95
S 6C		SEE AE-C								
S 6E		SEE AE-E								
S3-3		UNITED STATES	ODD-USAF	07/08/76	GEOCENTRIC	76-065B	07/08/76	NORMAL	STND	95
	FENNELL	ION-ELECTRON MASS SPECTROMETER				76-065B-08	07/08/76	NORMAL	STND	96
	MOZER	DC ELECTRIC FIELDS				76-065B-01	07/09/76	NORMAL	STND	96
	SHARP	LOW-ENERGY PARTICLE SPECTROMETER				76-065B-02	07/08/76	NORMAL	STND	96
	VAMPOLA	ENERGETIC ELECTRON MAGNETIC SPECTROMETER				76-065B-07	07/08/76	NORMAL	STND	96
	WILDMAN	ELECTRIC FIELDS-ION DRIFT				76-065B-05	07/08/76	NORMAL	STND	96
	YATES	LOW-ENERGY PROTON SPECTROMETERS				76-065B-03	07/08/76	NORMAL	STND	96
	YATES	PROTON TELESCOPE				76-065B-04	07/08/76	NORMAL	STND	96

* SPACECRAFT NAME	COUNTRY AND AGENCY	LAUNCH DATE	ORBIT TYPE	* NSSDC ID	EPOCH MMDDYY	STATUS	DATA RATE	PAGE NO.
*PRINC.INVEST.NAME	EXPERIMENT NAME							
S74-2	SEE S3-3							
SAGE	UNITED STATES	NASA-OSTA	02/18/79 GEOCENTRIC	79-013A	02/18/79	NORMAL	STND	96
MCCORMICK	STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE)			79-013A-01	02/28/79	NORMAL	STND	97
SAN MARCO-D/L	ITALY	CRA	09/15/81 GEOCENTRIC	SM-DL		APPROVED MISSION		164
	UNITED STATES	NASA-OSS						
BROGLIO	DRAG BALANCE AND AIR DENSITY			SM-DL -01				164
HANSON	IVI-ION VELOCITY INSTRUMENT (PLANAR RETARDING POTENTIAL ANALYZER)			SM-DL -03				164
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INVESTIGATOR NAME INDEX

5. INVESTIGATOR NAME INDEX

This index contains an alphabetical listing of the names of the investigators or team members associated with each experiment described in Sections 2 and 3 of this report. The current organizational affiliation of the person is also shown. Listed under each person's name are the associated experiments. Each experiment contains the spacecraft and experiment name, NSSDC ID code, and the page number referencing the description of the experiment found in this report. An asterisk, which precedes an experiment name, identifies the person associated with that experiment as the principal investigator or team leader.

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APPENDIX A - OTHER RELEVANT SPACECRAFT

Spacecraft relevant to the purpose of this report and not included elsewhere are listed in this Appendix. The spacecraft include those that have previously been published in earlier reports of this series and now have a status of cancelled, failed at launch, or mission being rescoped. Included are spacecraft which are essentially dormant which are used to provide new science and technology information incorporating ground-based facilities and techniques. In this latter group are the air density studies using air drag effects and ground based photography, radio beacon receptions, celestial mechanics studies using spacecraft motions and radio transmissions, and laser retroreflector studies. In addition, some spacecraft that were turned off but were still operable in the last report and dropped from this report are listed; it is extremely unlikely these will ever be re-activated. Some missions that are under study might be included if these seem likely to be approved in the near future. The investigators for these missions have not yet been chosen. The spacecraft are listed alphabetically by the NSSDC spacecraft common name. Listed with each spacecraft are the sponsoring country and agency, the actual launch date, the NSSDC ID code, and the status. A definition of the terms used in the current status column can be found in Appendix C.

<u>Spacecraft Name</u>	<u>Sponsoring Country and Agency</u>		<u>Launch Date</u>	<u>NSSDC ID</u>	<u>Current Status</u>
AD-A	United States	NASA-OSS	12/19/63	63-053A	Air Density Studies
AD-C	United States	NASA-OSS	08/08/63	68-066A	Air Density Studies
Apollo 11	United States	NASA-OMSF	07/16/69	69-059C	Laser Retroreflector
Apollo 14	United States United States	NASA-OMSF NASA-OSS	01/31/71	71-008C	Laser Retroreflector
Apollo 15	United States United States	NASA-OMSF NASA-OSS	07/26/71	71-063C	Laser Retroreflector
ATS 5	United States	NASA-OSTA	08/12/69	69-069A	Radio Beacon
BE-C	United States	NASA-OSS	04/29/65	65-032A	Laser Retroreflector
GEOS 1	United States	NASA-OSS	11/06/75	65-089A	Laser Retroreflector
GEOS 2	United States	NASA-OSS	01/11/68	68-002A	Laser Retroreflector
Hawkeye 1	United States	NASA-OSS	06/03/74	74-040A	Inoperable 4/28/78
LAGEOS	United States	NASA-OSTA	05/04/76	76-039A	Laser Retroreflector
Landsat 1	United States	NASA-OSTA	07/23/72	72-058A	Inoperable 1/26/78
Prognoz 5	U.S.S.R.	SAS	11/25/76	76-112A	Inoperable 7/20/77
Pioneer 7	United States	NASA-OSS	08/17/66	66-075A	Celestial Mechanics
Pioneer 8	United States	NASA-OSS	12/13/67	67-123A	Celestial Mechanics
S3-2	United States	DOD-USAF	12/03/75	75-114B	Inoperable 5/01/78
Solrad 10	United States United States	NASA-OSS DOD-USN	07/08/71	71-058A	Inoperable 7/00/78

APPENDIX B - SPECIAL INVESTIGATORS

B1. Joint IRAS Science Working Group

The Infrared Astronomy Satellite (IRAS), like TUE, does not have individual principal investigators or team leaders associated with each experiment. Operation of the spacecraft is by the Joint IRAS Science Working Group. Members of this Working Group and their affiliations are listed.

B2. The Caravane Collaboration (COS-B)

The gamma-ray astronomy experiment for COS-B was built, operated, and the data analyzed by a collaboration of six European research groups. Group members that have played a significant role in the implementation of the program are listed with their affiliation.

B3. Individual Galileo Investigations

The Orbiter Imaging and Radio Science investigations include individual studies. The individual investigation name, the objectives, and the investigator and his affiliation are listed.

B4. AMPTE/Charge Composition Explorer (CCE)/Ion Release Module (IRM) Scientific Team

The AMPTE/Charge Composition Explorer/Ion Release Module investigations are conducted by an international scientific team. The members of this scientific team and their affiliations are listed. The Co-Principal Investigators are indicated by an asterisk. This team has rights to the data from each investigation on the two missions while the experiment personnel listed in Section 3.3 have rights only to data from their experiment.

B5. Copernicus Guest Investigators and Investigations

Copernicus (OAO 3) was used by a number of special investigators. The original individual investigation name, the guest investigators, and their affiliation are listed in Appendix B5a. Renewed investigation programs and investigators are listed in Appendix B5b.

B6. International Solar Polar Mission (ISPM) Theoretical and Interdisciplinary Scientists

The names and affiliation of ISPM theoretical and interdisciplinary scientists are listed.

B7. Magsat Investigations

Investigators who use one or both of the magnetometers on magsat are listed with their investigations.

B8. Additional Firewheel Investigations

Recently, additional investigations were identified for the Firewheel spacecraft and sub-payloads. Listed are the NSSDC ID, the investigation name, and the investigators and their affiliations.

Bl. Joint Infrared Astronomy Satellite (IRAS) Science Working Group

<u>Member</u>	<u>Affiliation</u>
Aumann, H. H.	NASA-JPL
Beintema, D.	University of Groningen, The Netherlands
Borgman, J.	University of Groningen, The Netherlands
Clegg, P.	Queen Mary College, UK
Dejong, T.	University of Leiden, The Netherlands
Gillette, F.	Kitt Peak National Observatory
Habing, A.	University of Leiden, The Netherlands
Hauser, M.	NASA-GSFC
Houck, J.	Cornell University
Jennings, R.	University of College London, UK
Low, F.	University of Arizona
Marsden, P.	University of Leeds, UK
Neugebauer, G.	California Institute of Technology (U.S. Principal Scientist, Co-Chairman)
Pottasch, S.	University of Groningen, The Netherlands
Soifer, T.	California Institute of Technology
Van Duinen, R.	University of Groningen, The Netherlands (European Principal Scientist, Co-Chairman)
Walker, R.	NASA-ARC

B2. The Caravane Collaboration (COS-B)

<u>Member</u>	<u>Affiliation</u>
Bennett, K.	Space Science Department, ESA-ESTEC Noordwijk, The Netherlands
Bignami, G. F.	Istituto di Scienze Fisiche dell'Università di Milano, Italy
Boella, G.	Istituto di Scienze Fisiche dell'Università di Milano, Italy
Buccheri, R.	Università di Palermo, Italy
Burger, J. J.	Scientific Projects Department, ESA-ESTEC Noordwijk, The Netherlands
D'Amico, N.	Università di Palermo, Italy
Hermesen, W.	Huygens Laboratorium, Leiden, The Netherlands
Kanbach, G.	Max-Planck-Institut für Physik und Astrophysik, Garching bei München, Federal Republic of Germany
Koch, L.	Centre d'Etudes Nucléaires de Saclay, Gif-sur-Yvette, France
Labeyrie, J.	Centre d'Etudes Nucléaires de Saclay, Gif-sur-Yvette, France
Lichti, G. G.	Space Science Department, ESA-ESTEC Noordwijk, The Netherlands
Lüst, R.	Max-Planck-Institut für Physik und Astrophysik, Garching bei München, Federal Republic of Germany
Masnou, J.	Centre d'Etudes Nucléaires de Saclay, Gif-sur-Yvette, France
Mayer-Hasselwander, H. A.	Max-Planck-Institut für Physik und Astrophysik, Garching bei München, Federal Republic of Germany

<u>Member</u>	<u>Affiliation</u>
Occhialini, G. P.	Istituto di Scienze Fisiche dell'Università di Milano, Italy
Paul, J. A.	Centre d'Etudes Nucléaires de Saclay, Gif-sur-Yvette, France
Pinkau, K.	Max-Planck-Institut für Physik und Astrophysik, Garching bei München, Federal Republic of Germany
Sacco, B.	Università di Palermo, Italy
Scarsi, L.	Università di Palermo, Italy
Swanenburg, B. N.	Huygens Laboratorium, Leiden, The Netherlands
Taylor, B. G.	Space Science Department, ESA-ESTEC Noordwijk, The Netherlands
Trendelenburg, E. A.	ESA Headquarters, Paris, France
van de Hulst, H. C.	Huygens Laboratorium Leiden, The Netherlands
Wills, R. D.	Space Science Department, ESA-ESTEC Noordwijk, The Netherlands

B3. INDIVIDUAL GALILEO INVESTIGATIONS

IMAGING INVESTIGATIONS

<u>Investigation Name</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Jovian Auroral Studies	To search for and investigate Jupiter's auro- ras; to use auroral im- aging to obtain infor- mation on the configu- ration and dynamics of the Jovian magnetosphere; to search for luminous phenomena on the dark sides of the Galilean satellites.	Clifford D. Anger University of Calgary
Structure and Dynam- ics of the Jovian Atmosphere	To investigate the phy- sical structure and dy- namical regimes of the Jovian atmosphere, in- cluding cloud motion, heat transfer, cloud com- position and scattering properties, and atmo- sphere wave motions.	Michael J.S. Belton Kitt Peak National Observatory
Geological Histories of the Galilean Satellites	To investigate the geo- logic histories of the Galilean satellites by photogeologic techniques to determine surface morphology and measure local elevations and height contours, and by the preparation of con- tour maps and geological maps.	Michael H. Carr U.S. Geological Survey

GALILEO IMAGING INVESTIGATIONS

<u>Investigation Name</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Jovian Atmospheric Dynamics and Satellite Histories	To study dynamics of the upper atmosphere of Jupiter by determining cloud motions and evolution; to synthesize Galileo imagery with previous imagery, including ground-based patrol photography; to study surface histories of the Galilean satellites, particularly by crater density and morphology; and to investigate possibilities to make imaging studies of smaller Jovian satellites and of asteroid targets of opportunity.	Clark R. Chapman Planetary Science Institute
Geodetics of the Galilean Satellites	To establish a geodetic net on the Galilean satellites and determine their radii, shapes, and rotational poles; to provide satellite control nets for precision cartography.	Merton E. Davies Rand Corporation
Geological Exploration of the Galilean Satellites	To investigate the geology of the Galilean satellites using photographic techniques, with emphasis on cratering, tectonic processes, and the discovery of new geological processes associated with the presence of icy crusts on the satellites.	Ronald Greeley Arizona State University

GALILEO IMAGING INVESTIGATIONS

<u>Investigation Name</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Dynamical Properties of the Galilean Satellites	To study the internal structure and past history of the Galilean satellites from dynamical studies of shape and rotation; to investigate impact cratering and chronology; to search for previously undiscovered satellites in the Jovian system.	Richard Greenberg Planetary Science Institute
Geology of the Galilean Satellites	To investigate surface morphology and infer geologic histories of the Galilean satellites, with emphasis on impact cratering processes and comparative studies with the terrestrial planets.	James W. Head, III Brown University
Photogeology of the Galilean Satellites	To investigate the geology of the Galilean satellites with emphasis on impact cratering processes; to develop a multispectral image processing capability and imaging data library in Europe.	Gerhard Neukum Münich University, Federal Republic of Germany
Photometry and Imaging of Jupiter and the Galilean Satellites	To investigate the Jovian atmosphere and cloud properties by multispectral photometry and polarimetry; to study surface composition of the Galilean satellites with emphasis on the role of volatiles; to search for auroral emissions from the interaction of satellite atmospheres with the Jovian magnetosphere.	Carl B. Pilcher University of Hawaii

GALILEO IMAGING INVESTIGATIONS

<u>Investigation Name</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Jovian Atmospheric Circulation	To investigate the nature of the thermal and dynamical processes responsible for the atmospheric circulation of Jupiter and the ways that these processes are influenced by the structure of the cloud layers.	Gerald Schubert University of California, Los Angeles
Imaging, Spectrophotometry, and Polarimetry of the Galilean Satellites and Jupiter	To investigate the surface morphology and spectro-photometric properties of the Galilean satellites; to identify compositional units of the satellites; to obtain photometry of Jovian belts and zones to investigate cloud properties and energy balance; to investigate possibilities for making photo-polarimetric observations of the smaller Jovian satellites.	Joseph Veverka Cornell University
Multispectral Radiometric Imaging of Jupiter and the Galilean Satellites	To participate closely in the development of a multispectral radiometric imaging capability for Galileo, including design of the camera system, its calibration, and development of image processing software; to use these multispectral images to study compositional differences on the surfaces of the Galilean satellites and in the atmosphere of Jupiter.	John B. Wellman Jet Propulsion Laboratory

B3 continued

GALILEO RADIO SCIENCE

<u>Investigation Name</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Celestial Mechanics Measurements of Jupiter and Its Satellites	To use closed-loop radio-metric data from the Galileo orbiter to: (1) determine the structure of the gravitational fields of Jupiter and the Galilean satellites; (2) determine the relativistic time delay during the solar conjunction of Jupiter; and (3) improve the determination of the orbits of Jupiter and its satellites. Also, to measure the general relativistic redshift in the gravitational field of Jupiter (by using one-way Doppler data).	John D. Anderson Jet Propulsion Laboratory
Atmospheres and Ionospheres of Jupiter and Its Satellites	(1) To use S-X band occultation techniques to measure the vertical pressure and temperature profiles and atmospheric absorptivity on Jupiter, the Jovian ionospheric structure and dynamics, and the plasma environments of the Galilean satellites. (2) To use phase and intensity scintillation data to study atmospheric turbulence and convection on Jupiter. (3) To investigate the use of bistatic radar techniques to study the surfaces of the Galilean satellites.	Von R. Eshleman Stanford University

GALILEO RADIO SCIENCE

<u>Investigation Name</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Search for Gravitational Radiation	To use high-precision Doppler monitoring during cruise to conduct a systematic search for very low frequency gravitational waves incident on the solar system, to a level of strain amplitude of about $E-15$.	Frank B. Estabrook Jet Propulsion Laboratory
Jupiter Radio Astronomy	To study relativistic electrons in the Jovian magnetosphere by measuring the integrated radio flux near 400 MHz (using the Probe relay antenna) over a large range in time and geometry.	Eric Gerard Meudon Observatory
Microwave Investigation of Jupiter	To use the Probe relay antenna to study the trapped radiation belts of Jupiter and to measure the thermal microwave radiation from the planet with high spatial resolution. Also, to measure the thermal microwave brightness of the Galilean satellites in order to study their surface properties.	Samuel Gulkis Jet Propulsion Laboratory

B3 concluded

GALILEO RADIO SCIENCE

<u>Investigation Name</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Atmospheres and Ionospheres of Jupiter and Its Satellites	To use S-X band occultation techniques to study the atmospheres and ionospheres of Jupiter and the Galilean satellites, with emphasis on the neutral atmospheres. For Jupiter, the occultation data determines temperature, pressure, and density profiles down to the 100 mb pressure level. In addition, deviations of the local vertical direction from the predicted value will be determined and used to study zonal wind velocities in the Jovian atmosphere.	Arvydas J. Kliore Jet Propulsion Laboratory
Atmospheres and Ionospheres of Jupiter and Its Satellites	To use S-X band occultation techniques to study the atmospheres and ionospheres of Jupiter and the Galilean satellites, with emphasis on ionospheric measurements. In the ionosphere, the occultation data yield electron number density and plasma scale height profiles.	Gunnar Lindal Jet Propulsion Laboratory
Radio Scintillation in the Jovian Atmosphere	To use spacecraft radio scintillations to measure and study turbulence in the Jovian atmosphere, and electron density irregularities, magnetic field direction, and winds in the Jovian ionosphere. Also, where possible, to take similar measurements of the Galilean satellites.	Richard Woo Jet Propulsion Laboratory

B4. AMPTE/Charge Composition Explorer (CCE)/Ion Release
Module (IRM) Scientific Team

<u>Member</u>	<u>Affiliation</u>
Bostrom, C. O. Foppl, H.	APL Max-Planck-Institut für Extraterrestrische Physik, Garching bei München Federal Republic of Germany
Gloecker, G. *Haerendel, G.	U of Maryland Max-Planck-Institut für Extraterrestrische Physik, Garching bei München Federal Republic of Germany
Hausler, B.	Max-Planck-Institut für Extraterrestrische Physik, Garching bei München Federal Republic of Germany
*Krimigis, S. M. McEntire, R. W. Paschmann, G.	APL APL Max-Planck-Institut für Extraterrestrische Physik, Garching bei München Federal Republic of Germany
Shelley, E. G. Valenzuela, A.	Lockheed Palo Alto Research Laboratory Max-Planck-Institut für Extraterrestrische Physik, Garching bei München Federal Republic of Germany

B5a. Copernicus Guest Investigators and Investigations

Investigation of the MgII Resonance Doublet in Early Type Stars

Y. Kondo, NASA Johnson Space Center and J. L. Modisette,
Houston Baptist College

Study of the UV Spectrum of γ Peg

S. R. Heap, GSFC

Study of the UV Spectrum of ζ Tau

S. R. Heap, GSFC

Studies of Early Type Supergiants

M. Hack and R. Stalio, Trieste

Observations of Emission Lines in Late-Type Stars - K Stars

J. Linsky, U. of Colorado; W. Moos and R. O. Henry, Johns Hopkins
University

A Study of Supergiant Spectra

A. Underhill, GSFC

Mass Loss Models of γ^2 Vel

T. P. Stecher and D. West, GSFC

Investigation of Mass Flow in Close Binaries

Y. Kondo, NASA Johnson Space Center and
G. McCluskey, Lehigh University

Ultraviolet Stellar Silicon Lines in τ Sco

L. Kamp, GSFC

Determination of the Oscillator Strengths of FeII Far UV Lines

S. R. Pottasch, Kapteyn Astronomical Obs.

Measurement of the Profile of Ly- α Reradiation from Jupiter

L. Wallace, Kitt Peak National Obs.

Observation of Interstellar Lines from Stars behind the Supernova Remnant Vela-X

G. Wallerstein, U. of Washington and
J. Silk, Berkeley

Copernicus Guest Investigators and Investigations

Abundance of Interstellar Boron

T. P. Stecher, GSFC

Ultraviolet Spectrophotometry of Bp, Ap, and Magnetic Variable Stars

D. Leckrone, GSFC

Comparison of IR and Radio Observations of Nebulae with UV Data for the
Exciting Stars

H. M. Johnson, Lockheed

Comparison of Ap and Bp Stars of Types Mn and Si

M. Hack and R. Stalio, Trieste and

M. Friedjung, Institut d'Astrophysique (Paris)

Spectrophotometric Observations of β Per on the *Copernicus* Satellite

F. B. Wood and K. Y. Chen, U. of Florida

Near UV Studies of F and K Dwarfs for Comparison with Redshifted Spectra
of Galaxies

H. Spinrad, Berkeley

Observations of Emission Lines in Late Type Stars - F Stars

R. Wilson, R. G. Evans, and C. Jordan, Culham

Observations of Ap Stars

M. Molnar, U. of Toledo

Chromospheric Emission in G-Type Stars

A. Dupree and R. Noyes, Harvard

Observations of Stars which Show Anomalies in Data from the European
Satellite TD1

a) The FeII lines from 1900-2000 A

b) The SiII and C IV lines 1526-1551 A

c) Observations of Unusual Features in A Stars

P. Swings, Liege

Investigation of the MgII Resonance Doublet in Early Type Stars

H. J. Lamers and T. A. J. Snijders, Utrecht

Observations of Shell Stars

M. Plavec, UCLA

Study of the D/H Ratio in the Interstellar Medium

R. Bonnet and A. Vidal-Madjar, C.N.R.S., France

B5a continued

Copernicus Guest Investigators and Investigations

Study of β Lyr at Four Phases

M. Hack, Trieste; J. B. Hutchings, Dominion Astrophysical Observatory;
Y. Kondo, NASA Johnson Space Center; G. McCluskey, Lehigh University;
M. Plavec, UCLA

Study of Interstellar Lyman- α Absorption

R. C. Bohlin, GSFC

Study of Mass Flow in OB Supergiants

J. Hutchings, Dominion Astrophysical Observatory

Study of Chromospheric Emission in A-Stars

F. Praderie, Institut d'Astrophysique

Multiple Interstellar Cloud Components in Bright O-B Stars

S. R. Pottasch, Kapteyn Observatory

A Study of the UV Spectrum of Zeta Puppis

A. B. Underhill, GSFC

A Study of Interstellar Hydrogen: Atomic and Molecular

R. Bohlin, GSFC

B. Savage, University of Wisconsin

Ultraviolet Study of Interacting and Peculiar Spectroscopic Binaries

J. N. Bahcall, Institute for Advanced Studies

N. A. Bahcall, I.A.S.

J. I. Katz, I.A.S.

Spectroscopic Study of X Per

J. N. Bahcall, Institute for Advanced Studies

N. A. Bahcall, I.A.S.

Ultraviolet Study of a Candidate for 3U0750-49

J. N. Bahcall, Institute for Advanced Studies

N. A. Bahcall, I.A.S.

E. Kellogg, Center for Astrophysics

B. Flannery, Harvard

Calibration of Far-UV Stellar Fluxes

A. D. Code, U. of Wisconsin

R. C. Bless, U. of Wisconsin

A Search for Boron in Ap Stars

A. M. Boesgaard, U. of Hawaii

Stellar Beryllium and Boron Abundances

H. L. Shipman, U. of Delaware

Copernicus Guest Investigators and Investigations

Far-UV Spectra of Pole-On Be Stars

G. J. Peters, UCLA

Short-Lived and Heavy Elements in Stellar Atmospheres

A. A. Boyarchuk, Crimean Astrophysical Observatory

A. W. Severny, Crimean Astrophysical Observatory

Study of HD in the Line of Sight to Zeta Ophiuchi

E. L. Wright, Center for Astrophysics

A Study of the Spectroscopic Binary θ^2 Ori A

P. L. Bernacca, Padova (Italy)

Wavelength Calibration of WEP Planetary Observations

J. Caldwell, Princeton

UV Observations of α Centauri

D. Klinglesmith, GSFC

Study of UV Geocoronal Airglow

G. Riegler, Jet Propulsion Laboratories

Radius and Composition of Sirius B

M. Savedoff, U. of Rochester

H. M. Van Horn, U. of Rochester

A Study of Carbon Lines in Early Type Stars

K. van der Hucht, Utrecht

N. Sakhibulin, U.S.S.R.

An Intragalactic Laser Beacon Experiment

H. Wischnia, Perkin-Elmer

A Study of CO in the Line of Sight to Zeta Ophiuchi

A. Penzias, Bell Laboratories

P. Wannier, University of Massachusetts

A Search for Interstellar Fluorine

E. H. Pinnington, University of Alberta

A Study of β Cephei Stars

G. Hill, D.A.O.

J. B. Hutchings, D.A.O.

Comparison of UV Spectra of Rapidly and Slowly Rotating O and B Stars

S. Heap, GSFC

B5a continued

Copernicus Guest Investigators and Investigations

Spectral Observations of the 1240 Å NV UV Resonance Lines

R. McCray, JILA

B. Savage, JILA (U. of Wisconsin)

Study of Interstellar CI in ζ Pup

K. de Boer, Groningen

MgII Lines in the Spectrum of α^2 CMa

T. Snijders, GSFC

Line Profile Variations in β Cephei Stars

J. Lesh, U. of Denver

M. Jerzykiewicz, Wrocław, Poland

T. Jarzebowski, Wrocław, Poland

Study of Oe Stars

P. Conti, JILA

Martian Lyman α Emission Near Solar Minimum

J. S. Levine, NASA Langley Research Center

D. S. McDougal, NASA Langley Research Center

Atmospheric Absorption: Chlorine and Ozone

G. Riegler, Jet Propulsion Laboratories

Diffuse Lyman Alpha Sky Background

T. Adams, U. of Chicago

Investigation of Weak Helium Line Bp Stars

O. Vilhu, Helsinki

The Spectrum of α Cygni, A2Ia

A. Underhill, GSFC

Ly- α Radiation from Jupiter and Io

J. Bertaux, CNRS, Paris

J. Blamont, CNRS, Paris

M. Festou, CNRS, Paris

Use of Jupiter as a Planetary Spectrometer

R. Bonnet, CNRS, Paris

A. Vidal Madjar, CNRS, Paris

C. Laurent, CNRS, Paris

Period Coverage of Line Variations in α And.

H. Wood, Vienna

K. Rakosch, Vienna

Copernicus Guest Investigators and Investigations

Study of the UV Spectrum of P Cygni

V. Ambartsumian, Byurakan, Armenia, U.S.S.R.

L. Mirzoyan, Byurakan, Armenia, U.S.S.R.

Study of the Ionization Structure of the Nearby Intercloud Gas
in Order to Determine the Interstellar EUV Radiation Field

M. Grewing, Bonn

M. Walmsley, Bonn

Depletions and Physical Conditions Within Diffuse Interstellar Clouds

M. Jura, UCLA

Study of ν Sgr

M. Hack, Trieste

M. Friedjung, Institut d'Astrophysique

Interstellar Molecules

Wm. Smith, Princeton

Ultraviolet Ammonia Absorption on Jupiter

W. Macy, U. of Texas

T. Owen, SUNY, Stony Brook

M. Tomasko, U. of Arizona

Copernicus Scans of Comet 1975h

J. L. Bertaux, CNRS

H. U. Keller, Max Planck Institut

UV Line Emission from Io

D. Matson, JPL

Ultraviolet Observations of Nova Cygni 1975

M. Friedjung, Institute d'Astrophysique

J. Gallagher, U. of Minn.

R. Henry, Johns Hopkins

J. Linsky, JILA

W. Moos, Johns Hopkins

S. Starrfield, Arizona State

CI Opacity in Late B-Stars

M. Snijders, GSFC

Chromospheres and Coronae in Stars of Type A and F

J. Linsky, JILA

H. Moos, Johns Hopkins

R. Henry, Johns Hopkins

B5a continued

Copernicus Guest Investigators and Investigations

Absolute Measurements of Interstellar Medium Radial Velocities

J. L. Bertaux, CNRS

Interstellar Conditions in the Gum Nebula

J. Silk, Berkeley

G. Wallerstein, U. Washington

Interstellar O VI in Supernova Remnants

L. Cowie, Princeton

The Ultraviolet Spectrum of α Pavonis

M. Savedoff, U. Rochester

Profile Variations in the Spectrum of β Persei

S. Rucinski, Inst. Astronomy, Warsaw

J. Hutchings, Dominion Astrophysical Observatory

Ultraviolet Observations of Planetary Nebulae

R. Schwartz, U. Mo.-St. Louis

UV Emission from Planetary Nebulae

R. Bohlin, GSFC

T. Stecher, GSFC

Observations of Local Interstellar Hydrogen

R. Henry, Johns Hopkins

J. Linsky, JILA

H. Moos, Johns Hopkins

UV Spectrum of γ Peg

S. Adelman, Boston U.

Mass Loss in the Binary System Vela-X

E. van den Heuvel, U. Amsterdam

H. Lamers, Utrecht

B. Savage, U. Wisconsin

R. McCray, J.I.L.A.

Intercloud Absorption towards α^2 CMa

J. Hill, N.R.A.O.

Search for Interstellar N_2

T. Owen, S.U.N.Y. Stony Brook

UV Studies of Stellar Heavy Element Abundances

H. Shipman, U. Delaware

Copernicus Guest Investigators and Investigations

UV Observations of Globular Clusters

J. Bahcall, Institute for Advanced Study
N. Bahcall, Princeton
P. Sanfoord, UCL

H₂, NO in the Earth's Upper Atmosphere

S. Atreya, U. Michigan
G. Riegler, JPL

Ly- α Emission from Titan

T. Owen, SUNY - Stony Brook

Ly- α Emission from Saturn

R. Bonnet, CNRS
A. Vidal-Madjar, CNRS
C. Laurent, CNRS

UV Observations of Comet West

J. Bertaux, CNRS

Study of the Hot Spot at the Foot of the Io Flux Tube in Jupiter

S. Atreya, U. Michigan
T. Donohue, U. Michigan
Y. Yung, Harvard

UV Observations of G Stars for Beryllium, I.S. Ly- α

H. Shipman, U. Delaware
A. K. Dupree, Harvard

UV Spectral Classification

W. Bidelman, Case Western Reserve

Stellar Manganese and Mercury Observations

A. M. Boesgaard, U. Hawaii

UV Observations of the Massive Binary HD47129

M. Barlow, J.I.L.A.
P. Conti, J.I.L.A.

Interstellar Cloud Velocity Structure

L. Cowie, Princeton

High-Velocity Gas in the Orion Region

L. Cowie, Princeton

Survey of Interstellar Abundances

R. C. Bohlin, GSFC
B. D. Savage, U. Wisconsin
T. Snow, LASP

B5a continued

Copernicus Guest Investigators and Investigations

Study of Mercury in Ap-Hg Stars
C. Megessier, Obs. de Paris
G. Michaud, U. Montreal

Ultraviolet He I Lines in OB Stars
C. D. McKeith, Queens U., Belfast
P. L. Dufton, Queens U., Belfast

Variations in UV Spectra of Be Stars
A. Slettebak, Ohio State U.

Rotational Broadening in UV Spectral Lines
G. W. Collins, Ohio State U.

Comet d'Arrest
J. L. Bertaux, CNRS

Survey of Cool H I Clouds
M. Jura, UCLA

Mass Loss from Early B Stars
M. Smith, U. Texas

UV Spectrum of Eta Carinae
R. Viotti

Synoptic Study of Chromospheric Emission Lines
R. C. Henry, Johns Hopkins
J. Linsky, J.I.L.A.
H. W. Moos, Johns Hopkins

Rotational Line Broadening in B Stars
J. B. Hutchings, Dominion Astrophysical Observatory

The Stellar Wind Spectrum of γ^2 Vel
R. Wilson, UCL

Variability in Stellar Wind from ζ Puppis
G. Wegner, South African Astron. Observatory

Intrinsic Polarization and Mass Loss in δ Ori A
D. Hayes, Columbia

Mass Loss from HD50896
J. P. Cassinelli, U. of Wisconsin

Ultraviolet Spectra of Ap Stars
M. Hack, Trieste
R. Farragianna, Trieste

Copernicus Guest Investigators and Investigations

Orbit Determination for Spica

T. Morgan, Houston Baptist University

Circumstellar Material in Antares AB

D. P. Gilra, Groningen

J. P. Swings, Liege

Stellar Winds in OB Supergiants

M. Hack, Trieste

R. Stalio, Trieste

Interstellar Clouds with Strong CH^+ Lines

P. Frisch, U. Chicago

Comparisons of Copernicus Spectra with other UV Data

G. Carruthers, NRL

C. Opal, NRL

Interstellar Cloud Velocity Structure

J. M. Shull, Berkeley

Mass Transfer in Close Binaries

J. Rahe, Bamberg

Y. Kondo, Johnson SC

G. McCluskey, Lehigh

Calibration of Copernicus UV Spectra

R. C. Bohlin, GSFC

C. C. Wu, GSFC

Search for I.S. B and Be

M. Meneguzzi, PUO

High Velocity Gas in Mon N

L. L. Cowie, PUO

Confirmation of C_2 Feature at 2313 Å Toward ζ Oph

T. P. Snow, LASP, Boulder

Weak Interstellar OI Lines Toward σ Per and ζ Per

T. P. Snow, LASP, Boulder

Study of Lambda Eridani

C. T. Bolton, David Dunlap Observatory

Study of η Ori A

T. Herczeg, Oklahoma

B5a continued

Copernicus Guest Investigators and Investigations

Ultraviolet Excesses in Close Binaries

R. H. Koch, Penn

R. J. Pfeiffer, Trenton State

Raman Scattered $\text{L}\alpha$ in Jupiter

W. D. Cochran, Texas

L. M. Trafton, Texas

Chromospheres of Classical Cepheids

E. G. Schmidt, Nebraska

Interstellar Deuterium

A. K. Dupree, Harvard

Forbidden C II Interstellar Lines

L. M. Hobbs, Yerkes

f-values and N I Abundances

D. C. Morton, Anglo-Austr. Obs.

Abundance of Boron in γ Gem

A. Boesgaard, Hawaii

F. Praderie, Inst. d'Ap.

Origin of Interstellar CH^+

M. Jura, UCLA

W. H. Smith, Washington U.

P. Frisch, U. of Chicago

MgII Resonance Lines in δ CMa

Y. Kondo, JSC

R. E. Stencel, JSC

Interstellar MgI

R. M. Crutcher, Illinois

Orbital Parameters in γ^2 Vel

J. Hutchings, DAO

Search for H_2 Emission in Late Type Stars

C. Jordan, Oxford

G. Brueckner, NRL

Search for Corona Features or Circumstellar Cloud Around Sirius B

M. Savedoff, Rochester

H. Van Horn, Rochester

B5a continued

Copernicus Guest Investigators and Investigations

Survey of Ap Si Star Atmospheres
C. Jamar, Liege

Close O Star Binaries
J. B. Hutchings, DAO

Search for Shell Lines in σ Sco and β Ceph
M. Smith, Texas

B5b. Renewed Copernicus Investigator Programs and Investigators

Mg II Doublet in Early-Type Stars

Y. Kondo, NASA Johnson SFC

J. Modisette, Houston Baptist College

Observations of Emission Lines in Late Type Stars - K Stars

J. Linsky, U. of Colorado

W. Moos and R. Henry, Johns Hopkins

Mass Flow in Close Binaries

Y. Kondo, Johnson Space Center

G. McCluskey, Lehigh

Interstellar Lines in Vela-X Supernova Remnant

G. Wallerstein, U. of Washington

J. Silk, Berkeley

UV Spectrophotometry of Ap Stars

D. Leckrone, GSFC

Comparison of Ap and Bp Stars of Types Mn and Si

M. Hack and R. Stalio, Trieste

Ultraviolet Spectrum of β Persei

K.-Y. Chen, U. Florida

F. Wood, U. Florida

Observations of Emission Lines in F-Stars

R. Evans, Culham

C. Jordan, Culham

R. Wilson, UCL

Observations of Ap Stars

M. Molnar, U. of Colorado

Chromospheric Emission in G-Stars

A. Dupree, Harvard

R. Noyes, Harvard

Comparison with TD1 Data

J. Swings, Liege

Observations of Shell Stars

M. Plavec, UCLA

Interstellar Deuterium

A. Vidal-Madjar, CNRS

R. Bonnet, CNRS

Renewed Copernicus Investigator Programs and Investigators

Study of β Lyrae

M. Hack, Trieste
J. B. Hutchings, DAO
Y. Kondo, Johnson Space Center
G. McCluskey, Lehigh
M. Plavec, UCLA

Mass Flow in OB Supergiants

J. Hutchings, DAO

Chromospheric Emission in A-Stars

F. Praderie, Institut d'Astrophysique

Chromospheric Emission in M-Stars

D. Lambert, U. of Texas

HI, HeI, OI Line Profiles

D. D. Meisel, State U. College at Geneseo

Be Stars Below 3000 A

J. Marlborough, U. Western Ont.

Light Ion Abundances in HR3089

J. B. Lester, Smithsonian Astrophysical Obser.

Line-Blanketing in Vega and Sirius

R. L. Kurucz, Harvard

Cloud Components in O-B Stars

S. R. Pottasch, Kapteyn Observatory

Interstellar Hydrogen Survey

R. Bohlin, GSFC
B. Savage, U. of Wisconsin

X-Ray Candidates (V Pup)

B. Flannery, Harvard

Boron Abundances in A-Stars

A. Boesgaard, U. of Hawaii
F. Praderie, Inst. d'Astrophysique, Paris

Shell Lines in the UV

G. J. Peters, UCLA

B5b continued

Renewed Copernicus Investigator Programs and Investigators

Heavy Elements in Ap Stars

A. Boyarchuk, Crimea Obs. U.S.S.R.

UV Observations

D. Klinglesmith, GSFC

Sirius B

M. Savedoff, U. of Rochester

H. Van Horn, U. of Rochester

CO Towards ζ Ophiuchi

A. Penzias

P. Wannier

Study of β Cephei Stars

J. Hutchings, DAO

G. Hill, DAO

Profile Variations in β Cephei Stars

J. Lesh, U. of Denver

M. Jerzykiewicz, Wroclaw

T. Jarzebowski, Wroclaw

Jupiter Ly- α

J. Bertaux, CNRS

J. Blamont, CNRS

M. Festou, CNRS

Local Interstellar H

R. Henry, Johns Hopkins

J. Linsky, JILA

H. Moos, Johns Hopkins

Interstellar Lines towards O^2 CMa

J. Hill, NRAO

H₂, NO in Upper Atmosphere

S. Atreya, U. Michigan

G. Riegler, JPL

Ly- α from Titan

T. Owen, SUNY Stony Brook

Saturn Ly- α Emission

R. Bonnet, CNRS

A. Vidal-Madjar, CNRS

C. Laurent, CNRS

B5b concluded

Renewed Copernicus Investigator Programs and Investigators

Mass Loss from Early B Stars
M. Smith, U. Texas

Strong CH Lines
P. Frisch, U. Chicago

B6. International Solar Polar Mission (ISPM)
Theoretical and Interdisciplinary Scientists

<u>Member</u>	<u>Affiliation</u>
A. Barnes	NASA/Ames Research Center
J. C. Brandt	NASA/Goddard Space Flight Center
L. A. Fisk	University of New Hampshire
J. R. Jokipii	University of Arizona
J. Lemaire	Institute d'Aeronomie Spatiale de Belgique
G. Noci	Arcetri Observatory, Italy
C. P. Sonett	University of Arizona

B7. LIST OF MAGSAT INVESTIGATORS

<u>Investigation Name</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Spherical Harmonic Representation of the Main Geomagnetic Field for World Charting and Investigation of Some Fundamental Problems of Physics and Geophysics	Produce an accurate model of the main geomagnetic field, together with reliable estimates of the accuracy of coefficients	David R. Barraclough Institute of Geological Sciences/UNITED KINGDOM
Investigation of Antarctic Crust and Upper Mantle Using Magsat and Other Geophysical Data	Using Magsat data, devise a general framework for the structure of Antarctica into which more specific and local measurements can be integrated	Charles R. Bentley University of Wisconsin
Geomagnetic Field Forecasting and Fluid Dynamics of the Core	To adjust the Gauss coefficients of the main field model of the Magsat data set to satisfy dynamic constraints; to use Magsat data to test the ability to forecast the structure of the internal geomagnetic field	Edward R. Benton University of Colorado
Magsat for Geomagnetic Studies in the Indian Region	Prepare a regional geomagnetic reference field and magnetic anomaly maps over the Indian and neighboring regions; to gain a clearer understanding of secondary effect features and the variability of the dawn/dusk field; to study in detail the equatorial electrojet and transient variations	B. N. Bhargava Indian Institute for Geomagnetism/INDIA
Satellite Magnetic and Gravity Investigation of the Eastern Indian Ocean	Produce magnetic anomaly maps of the Indian Ocean; quantify the comparison between Magsat data and GEOS 3 gravity data; interpret the magnetic data using ancillary data	Robert F. Brammer The Analytic Sciences Corporation

B7 continued

LIST OF MAGSAT INVESTIGATORS

<u>Investigation Name</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Studies of High Latitude Current Systems Using Magsat Vector Data	Understand the physical processes which control high latitude current systems; improve the confidence level in studies of internal field sources	J. Ronald Burrows National Research Council of Canada/ CANADA
Use of Magsat Anomaly Data for Crustal Structure and Mineral Resources in the U.S. Midcontinent	To analyze Magsat anomaly data to synthesize a total geologic model and interpret crustal geology in the midcontinent region; to contribute to the interpretation and calculation of the depth of the Curie Isotherm	Robert S. Carmichael University of Iowa
The Reduction, Verification and Interpretation of Magsat Magnetic Data Over Canada	Select quiet-time data; correct Magsat data for disturbance fields and apply the routines; compare Magsat and vector airborne data; combine Magsat and aircraft data of magnetic anomalies; produce regional interpretations relating to Earth structure	Richard L. Coles Energy, Mines and Resources Canada/CANADA
Magsat Data, the Regional Magnetic Field, and the Crustal Structure of Australia and Antarctica	Incorporate Magsat data into regional magnetic field charts to improve their accuracy; determine if differences exist in temperature-depth curves for different tectonic areas; study the boundaries between major tectonic blocks, between continental and oceanic crust; determine Curie point depth and crustal magnetization for Antarctica	James C. Dooley Bureau of Mineral Resources/AUSTRALIA

LIST OF MAGSAT INVESTIGATORS

<u>Investigation Name</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Proposal from Japanese National Team for Magsat Project	Analysis of the regional geomagnetic field around Japan and Japanese Antarctica; study the contributions to magnetic variations by electric currents and hydromagnetic waves in and above the ionosphere	Naoshi Fukushima Geophysics Research Laboratory/JAPAN
Crustal Structures Under the Active Volcanic Areas of Central and Eastern Mediterranean	Calculate the depth of the Curie temperature for the Mediterranean area, and relate to areas of volcanic activity; investigate the Italian and Tyrrhenian anomaly	Paolo Gasparini Osservatorio Vesuviano/ITALY
Geomagnetic Field Modeling by Optimal Recursive Filtering	To produce a state vector to predict field values for several years beyond the Magsat model; to obtain optimal estimates of field values throughout the 1900-1980 period	Bruce P. Gibbs Business and Technological Systems, Incorporated
Magnetic Anomaly of Bangui	Improve the explanation of the cause of the Bangui anomaly, using Magsat data, other magnetic data, gravity, seismic, and heat flow data	M. R. Godivier Office de la Recherche Scientifique et Technique Outremer/FRANCE
The Mineralogy of Global Magnetic Anomalies	To interpret Magsat data to locate mafic and ultramafic source rocks and lineament expressions of anomalies that can be correlated with crustal of upper mantle depths; to determine mineral stabilities pertinent to magnetic anomalies to determine the magnetic properties of metamorphic rocks	Stephen F. Haggerty University of Massachusetts

LIST OF MAGSAT INVESTIGATORS

<u>Investigation Name</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Identification of the Magnetic Signatures of Lithostratigraphic and Structural Elements in the Canadian Shield Using Magnetic Anomalies and Data from Individual Tracks from Magsat	Confirm and extend the model for the crust mantle magnetization	D. H. Hall University of Manitoba/ CANADA
Investigations of Medium Wavelength Magnetic Anomalies in the Eastern Pacific Using Magsat Data	To determine the relationship of magnetic anomalies with surface geological features	Christopher G. A. Harrison University of Miami
An Investigation of Magsat and Complementary Data Emphasizing Precambrian Shields and Adjacent Areas of West Africa and South America	To determine the Magsat magnetic signatures of various tectonic provinces; to determine the geological associations of these signatures; to synthesize Magsat and other data with mineral resources data globally	David A. Hastings Michigan Technological University
Electromagnetic Deep-Probing (100-1000 kms) of the Earth's Interior from Artificial Satellites: Constraints on the Regional Emplacement of Crustal Resources	To evaluate the applicability of electromagnetic deep-sounding experiments using natural sources in the magnetosphere	John F. Hermance Brown University

LIST OF MAGSAT INVESTIGATORS

<u>Investigation Name</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Application of Magsat to Lithospheric Modeling in South America: Part I-- Processing and Interpretation of Magnetic and Gravity Anomaly Data	Magnetic anomalies will be used to develop lithospheric models to determine the properties of principal tectonic features; magnetic anomalies of South America will be correlated with those of adjacent continental areas to attempt to reconstruct Gondwanaland (see below)	William J. Hinze Purdue University
An Investigation of the Crustal Properties of Australia and Surrounding Regions Derived from Interpretation of Magsat Anomaly Field Data	Produce a map of surface magnetization to understand the evolution of the crust and to aid in mineral exploration	B. David Johnson Macquarie University/ AUSTRALIA
Application of Magsat to Lithospheric Modeling in South America Part II-- Synthesis of Geologic and Seismic Data for Development of Integrated Crustal Models	To provide models of the seismic velocity structure of the lithosphere (see above)	G. R. Keller University of Texas at El Paso
Investigation of the Effects of External Current Systems on the Magsat Data Utilizing Grid Cell Modeling Techniques	Apply a modeling procedure to the vector Magsat data in order to separate the terrestrial component from that due to extraterrestrial sources	David M. Klumpar The University of Texas at Dallas

B7 continued

LIST OF MAGSAT INVESTIGATORS

<u>Investigation Name</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Analysis of Intermediate-Wavelength Magnetic Anomalies Over the Oceans in Magsat and Sea Surface Data	To determine the distribution of intermediate wavelength magnetic anomalies of lithospheric origin in the oceans; the extent to which Magsat describes the distribution, and to determine the cause of these anomalies	John L. Labrecque Lamont-Doherty Geological Observatory
Magsat Investigations Consortium	Reduce Magsat vector data for a global analytic field model and constant altitude field maps; compare Magsat data to regional studies; study features of the core field; correlate globally and regionally Magsat and gravimetric data	Jean-Louis le Model Institut de Physique du Globe de Paris/France
Magsat Anomaly Field Inversion and Interpretation for the U.S.	To construct a regional crustal temperature/heat flow model based on a developed magnetization model, heat flow/production data, and spectral estimates of the Curie depth	Michael A. Mayhew Business and Technological Systems, Incorporated
Equivalent Source Modeling of the Main Field Using Magsat Data	To model the core field; compute equivalent spherical harmonic coefficients for comparison with other field models; to examine the spectral content of the core field	Michael A. Mayhew Business and Technological Systems, Incorporated

LIST OF MAGSAT INVESTIGATORS

<u>Investigation Name</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Structure, Composition, and Thermal State of the Crust in Brazil	Construct preliminary crustal models in the Brazilian territory; point out possible variations in crustal structure among different geological provinces	Igor I. Gil Pacca Instituto Astronomico Geofisico USP/BRAZIL
A Proposal for the Investigation of Magsat and Triad Magnetometer Data to Provide Corrective Information on High-Latitude External Fields	Identify and evaluate high latitude external fields from the comparison of data acquired by the Magsat and Triad spacecraft which can be used to improve geomagnetic field models	Thomas A. Potemra Johns Hopkins University
Improved Definition of Crustal Magnetic Anomalies in Magsat Data	Develop an improved method for the identification of magnetic anomalies of crustal origin in satellite data by better defining and removing the most persistent external field effects	Robert D. Regan Phoenix Corporation
Study of Enhanced Errors and of the Secular Magnetic Variation Using Magsat Models and Those Derived in Pogo Surveys	To estimate the secular variation over the period 1965-80 by removing mathematical instability based upon scalar field intensity alone	David P. Stern NASA/Goddard Space Flight Center
Proposal to Analyze the Magnetic Anomaly Maps from Magsat Over Portions of the Canadian and Other Shields	Examination of the expected difference between the Grenville and Superior provinces	David W. Strangway University of Toronto/ CANADA

B7 concluded

LIST OF MAGSAT INVESTIGATORS

Investigation Name

Objectives

Investigator and Affiliation

Compatibility Study
of the Magsat Data
and Aeromagnetic
Data in the Eastern
Piedmont of the U.S.

Evaluate the compati-
bility between the Mag-
sat and aeromagnetic
data in the Eastern
North Carolina Peidmont

Ihn Jae Won
North Carolina State
University

B8. ADDITIONAL FIREWHEEL INVESTIGATIONS

<u>NSSDC ID</u>	<u>Investigation Name</u>	<u>Investigator and Affiliation</u>
FIRE-A-03	Mass Spectrometer	R. W. McEntire JHU/APL
FIRE-B-01	DC Magnetometer	M. Acuna NASA/Goddard Space Flight Center
FIRE-B-02	Low-Energy Electron and Ion Detector	G. Paschmann MPI-Extraterr. Phys.
FIRE-B-03	Retarding Potential Analyzer	K. Spenner Inst. Space Phys. Res.
FIRE-B-04	Plasma Wave Experiment	D. A. Gurnett U of Iowa
FIRE-C-01	DC Magnetometer	M. Acuna NASA/Goddard Space Flight Center
FIRE-C-02	Suprathermal Electrons, Langmuir Probe	A. D. Johnstone Mullard Space Sci. Lab
FIRE-C-03	Energetic Particle experiment	D. A. Bryant Appleton Lab
FIRE-D-01	DC Magnetometer	M. Acuna NASA/Goddard Space Flight Center
FIRE-D-02	DC/AC Electric Field Experiment	F. S. Mozer U of Calif., Berkeley
FIRE-D-03	Energetic Ion Mass Spectrometer	C. W. Carlson U of Calif., Berkeley
FIRE-D-04	Proton/Electron Electrostatic Analyzer	J. Mallinckrodt U of Calif., Berkeley
FIRE-D-05	Low-Energy Electron Detector	R. Bush U of Calif., Berkeley
FIRE-D-06	Electron Density Measurement	C. Cattel U of Calif., Berkeley

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ADDITIONAL FIREWHEEL INVESTIGATIONS

<u>NSSDC ID</u>	<u>Investigation Name</u>	<u>Investigator and Affiliation</u>
FIRE-E-01	Magnetometer	M. Acuna NASA/Goddard Space Flight Center
FIRE-E-02	Particle Detectors	A. C. MacNamara Herzberg Inst.

APPENDIX C - DEFINITIONS

Several words and phrases are used in this report in a precise and specific sense. These terms are defined here to clarify the intended meaning to the reader.

- Active -** As applied to a spacecraft mission or one of its experiments pertinent to this report, a general status-of-operation term that means the spacecraft or experiment has been launched and was reported to NSSDC to have either a "normal" or "partial" status.
- Apoapsis -** The distance from the surface of the reference body to the furthest orbit point. This distance is expressed as astronomical units (AU) for heliocentric orbits, including planetary system flybys that became escape trajectories from the solar system; e.g., Pioneers 10 and 11. The units are kilometers (km) of altitude for all other orbits.
- Approved Mission -** A planned spacecraft mission status term that means the spacecraft mission has been approved, and funding is or will be available to perform the mission.
- Brief Description -** As applied to a spacecraft, a description containing a concise summary of the spacecraft mission, specifically outlining the overall objectives of the mission and the scientific studies being performed. As applied to an experiment, a description containing a concise summary of the experiment purpose and instrument characteristics, emphasizing those relevant to the scientific use of the resulting data.
- Canceled Mission -** As applied to a spacecraft mission, a status term that means the mission was canceled and no funds are expected to become available to carry out the mission.

Failed Mission - As applied to a spacecraft mission, a status term that means the spacecraft failed to achieve a suitable orbit, or the experiments failed to function after achieving orbit.

Inclination - The angle (in degrees) between the satellite orbital plane and the equatorial plane of the primary gravitational body. For satellites with heliocentric orbits, the ecliptic plane is used in lieu of the equatorial plane.

Inoperable - As applied to a spacecraft, a status-of-operation term that means the spacecraft is no longer capable of producing any useful scientific data because of malfunction or failure of the spacecraft system, completion of the phase of the spacecraft trajectory in which useful measurements could be performed, or network support (tracking, command, and telemetry) has been discontinued, etc. As applied to an experiment, a status-of-operation term that means the experiment is no longer capable of producing any useful scientific data because of a malfunction or failure of the experiment system or critical parts of the spacecraft system, or the completion of the phase of the spacecraft trajectory in which useful measurements could be performed.

Mission Being Rescoped - As applied to a spacecraft mission, a status term that means the mission has been redefined to an extent that the original mission plan and experiments are no longer valid and a new mission plan and experiments are under study.

Normal - As applied to an active spacecraft, a status-of-operation term that means the spacecraft and other required systems are capable of working so that the data would be suitable for all of the scientific studies planned for the spacecraft when the spacecraft is turned on and the data are recorded. As applied to an active experiment, a status-of-operation term that means all experiment and spacecraft systems are working so that the data would be suitable for all of the scientific studies originally planned for the experiment.

- NSSDC ID Code -** An identification code used in the NSSDC information system. In this system, each successfully launched spacecraft and experiment is assigned a code based on the launch sequence of the spacecraft. Subsequent to 1962, this code (e.g., 72-012A for the spacecraft Pioneer 10) corresponds to the COSPAR international designation. The experiment codes are based on the spacecraft code. For example, the experiments carried aboard the spacecraft 73-019A (Pioneer 11) are numbered 73-019A-01, 73-019A-02, etc. Each prelaunch spacecraft and experiment is also assigned an NSSDC ID code based on the name of the spacecraft. For example, the approved NASA launch, Solar Maximum Mission, would be coded SMM. The experiments to be carried aboard this spacecraft would be coded SMM -01, SMM -02, etc. Once a spacecraft is launched, its prelaunch designation is changed to a postlaunch designation; e.g., Pioneer-G, which was launched on April 6, 1973, was given the NSSDC ID code of 73-019A, corresponding to the launch spacecraft common name, Pioneer 11.
- Orbit Type -** A word or phrase indicating the most important phase of the trajectory of a given spacecraft mission. The orbit type may be any one of the following: geocentric, geocentric commensurate, selenocentric, heliocentric, Venuscentric, Marscentric, Areocentric, lunar lander, Venus lander, Mars lander, Jupiter lander, lunar flyby, Venus flyby, Mars flyby, Mercury flyby, Jupiter flyby, Venus probe, and Jupiter probe.
- Partial -** As applied to a spacecraft, a status-of-operation term that means the spacecraft and other required systems are working, but not all systems are working as well as the design required. If the spacecraft was turned on and the data recorded, the data would be suitable for only a portion of the scientific studies planned for the spacecraft. As applied to an experiment, a status-of-operation term defined similarly to that for a spacecraft.
- Periapsis -** The distance from the surface of the reference body to the nearest orbit point. This distance is expressed as astronomical units (AU) for heliocentric orbits, including planetary system flybys that became escape trajectories from the solar system; e.g., Pioneers 10 and 11. The units are kilometers (km) of altitude for all other orbits.

- Planned -** As applied to a spacecraft mission pertinent to this report, a general status term that means the spacecraft mission was last reported to NSSDC as either "approved" or "proposed." As applied to an experiment, a term that indicates an experiment is expected to fly on a planned spacecraft mission.
- Proposed Mission -** A planned mission status term that means the spacecraft design and the experiments have been selected; however, no funds have been approved to perform this mission.
- Standard -** As applied to a spacecraft or experiment data acquisition rate, a term that means the data that can be processed and made available to the experimenters are being acquired at the rate or percentage of coverage required to accomplish the planned scientific studies.
- Substandard -** As applied to a spacecraft or experiment data acquisition rate, a term that means the data that can be processed and made available to the experimenters are not being acquired at the rate or percentage of coverage required to continue all the planned scientific studies.
- Unknown -** As a general term, indicates information either unknown or unavailable at NSSDC.
- Zero -** As applied to a data acquisition rate, a term that means the spacecraft or experiment has been turned off except for state of health measurements and is in a standby condition capable of being returned to its previous status.

APPENDIX D - ABBREVIATIONS AND ACRONYMS

A	angstrom	B/W	black and white
ABMA	Army Ballistic Missile Agency	BWF	Bundesminister für Wissenschaftliche Forschung (Fed Rep of Germany)
ACAD	Academy	CAP	calcium fluoride
ACIC	Aeronautical Chart and Information Center (now Defense Mapping Agency Aerospace Center)	CAL	calorie
ACS	attitude control system	CAL TECH	California Institute of Technology
AD	Dual Air Density Explorer (satellite, NASA)	CALSPHERE	calibration sphere
A/D	analog to digital	CAMEO	Chemically Active Materials Ejected In Orbit (satellite, NASA)
AE	Atmosphere Explorer (satellite, NASA)	CAN	Canada
AEC	Atomic Energy Commission	CAS	Cooperative Applications Satellite (France-NASA)
AEM	Atmospheric Explorer Mission	CAV	composite analog video
AEROPROPUL	aeropropulsion	CBE	controlled beam emissions
AEROSAT	Aeronautical Satellite (NASA-ESA)	CCD	charge-coupled device
AEROSP	aerospace	CCE	Charge Composition Explorer (satellite, NASA)
AFB	Air Force Base	CCP	charge and current probes
AFCL	Air Force Cambridge Research Laboratories (now US Air Force Geophysics Laboratory)	CD	crystal detector
AFGL	Air Force Geophysics Laboratory	CDA	command and data acquisition (station)
AFO	Announcements of Flight Opportunities	CDC	Control Data Corporation
AFSC	Air Force Systems Command	C-DH	control and data handling
AGC	automatic gain control	CDS	cadmium sulfide
AGCY	agency	CEM	channel electron multipliers
AIMP	Anchored Interplanetary Monitoring Platform (satellite, NASA)	CENS	Centre d'Etudes Nucleaires de Saclay (France)
ALOSYN	Alouette topside sounder synoptic (data)	CFA	crossed electric and magnetic field analyzer
ALPO	Apollo Lunar Polar Orbiter (satellite, NASA); Association of Lunar and Planetary Observers	CHASE	coronal helium abundance Spacelab experiment
ALSEP	Apollo Lunar Surface Experiments Package (NASA)	CHEM	chemical
ALT	altitude	CID	cathode imaging detector
AM	amplitude modulation	CM	command module; centimeter
AMP	ampere	CMD	command
AMPS	Atmosphere, Magnetosphere, and Plasmas in Space (satellite, NASA)	CMS	composition measurement system
AMS	Army Map Service (now Defense Mapping Agency Topographic Center)	CN	cellulose nitrate
ANSAT	Radio Amateur Satellite Corporation	CNES	Centre National d'Etudes Spatiales (France)
AMU	atomic mass unit; astronaut maneuvering unit	CNET	Centre National d'Etudes des Telecommuni- cations (France)
ANIK	Canadian Telecommunications Satellite; also referred to as TELESAT	CNRS	Centre National de la Recherche Scienti- fique (France)
ANNA	Army, Navy, NASA, Air Force (geodetic satellite)	COBE	Cosmic Background Explorer (satellite, NASA)
ANS	Astronomical Netherlands Satellite (The Netherlands-NASA)	COMM	commission
AOSO	Advanced Orbiting Solar Observatory	COMSAT	Communications Satellite Corporation
AP	magnetic activity index Ap	CONIE	Comision Nacional de Investigacion del Espacio (Spain)
APL	Applied Physics Laboratory of Johns Hopkins University	CORSA	Cosmic-Ray Satellite (Japan)
APPL	application	COS	Cosmic-Ray Satellite (ESA); cosmic
APT	automatic picture transmission	COSPAR	Committee on Space Research
A/R	acquisition/reference	COUNC	council
ARC	Ames Research Center (NASA)	CO2	carbon dioxide
ARC-MIN	arc-minute	CPA	comprehensive particle analysis
ARC-S	arc-second	CPS	cycles per second
ARDC	Air Research and Development Command (now AFSC)	CPT	charged-particle telescope
ARPA	Advanced Research Projects Agency	CPU	central processing unit
ARSP	Aerospace Research Support Program (USAF)	CRC	Communications Research Centre (Canada)
AS+E	American Science & Engineering, Inc.	CRIE	Cosmic-ray isotope experiment
ASOS	antimony-sulfide oxy-sulfide	CRPL	Central Radio Propagation Laboratories (later ITSA; formerly part of ESSA; now NOAA/ERL)
ASTP	Apollo-Soyuz Test Project (USSR-NASA)	CRREL	Cold Region Research & Engineering Laboratories
ASTROPHYS	astrophysics	CRS	Commission for Space Research (Italy)
AT	atomic	CRT	cathode ray tube
ATCOS	Atmospheric Composition Satellite (NASA)	CSI	cesium iodide
ATDA	Alternate Target Docking Adapter	CSM	command service module
ATFE	advanced thermal control flight experiment	CSTE	cesium telluride
ATM	Apollo Telescope Mount; atmosphere	CTR	center
ATS	Applications Technology Satellite (NASA)	CTS	Canadian Telecommunications Satellite
AT+T	American Telephone & Telegraph Corp.	CXX	white-light coronagraph/X-ray XUV tele- scope
AU	astronomical unit	CZCS	coastal zone ocean color scanner
AUST	Australia		
AVCS	advanced vidicon camera system		
AVG	average		
AVHRR	advanced very high resolution radiometer		
AWRE	Atomic Weapons Research Establishment (Australia)	D	day
		DAC	data acquisition camera
BAF	barium fluoride	DADE	Dual Air Density Explorer (satellite, NASA)
BCD	binary coded decimal	DAN	Danish
BCG	ballistocardiogram	DAPP	Defense Acquisition and Processing Program (DOD)
BE	Beacon Explorer (satellite, NASA); beryllium	DASA	Defense Atomic Support Agency
BEV	billion electron volts	DATS	Despun Antenna Test Satellite (DOD)
BIC	barium iodide cloud	DB	decibel
BIOS	Biological Satellite (NASA)	DC	direct current
BPI	bits per inch	DCP	data collection platform
BPS	bits per second	DCS	direct couple system; data collection system
BSU	basic sounding unit	DE	dynamics explorer
BTL	Bell Telephone Laboratories	DEF	defense
BUV	backscatter ultraviolet	DEG	degree
BV	billion volts	DENPA	Density Phenomena (satellite, Japan)
		DEV	development

DFI	development flight instrumentation	ETR	Eastern Test Range (also referred to as Cape Canaveral)
DFVLR	Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt; English translation, Research Laboratory for Aeronautics and Astronautics, Fed Rep of Germany	ETS	Engineering Test Satellite
		EU	europlum
DIAL/MIKA	Diamant Allemande/Mini Kapsel (satellite, Fed Rep of Germany-France)	EUV	extreme ultraviolet
DIAL/WIKA	Diamant Allemande/Wissenschaftliche Kapsel (satellite, Fed Rep of Germany-France)	EUVUE	Extreme Ultraviolet Explorer
		EV	electron volt
DIAM	diameter	EVA	extravehicular activity
DIAPO	Diapason (satellite, France)	EVM	Earth viewing (equipment) module
DIRBE	diffuse infrared background experiment	EXOS	Exospheric Satellite (Japan)
DIT	Drexel Institute of Technology	EXOSAT	European X-ray Observation Satellite (ESA)
DMA	Defense Mapping Agency	EXTRATERR	extraterrestrial
DMAAC	Defense Mapping Agency Aerospace Center		
DMATC	Defense Mapping Agency Topographic Center		
DME	Direct Measurements Explorer (satellite, NASA)	FARO	Flare-Activated Radiobiological Observatory (satellite, DOD)
DMR	differential microwave radiometer	FAUST	far ultraviolet space telescope
DMSP	Defense Military Satellite Program (DOD)	FE	iron
DMJ	IUE data multiplex unit	FGS	fine guidance system
DOD	Department of Defense	FIRAS	far infrared absolute spectrophotometer
DODGE	Department of Defense Gravity Experiment (satellite, DOD)	FLT-SAT	Fleet Satellite (USN)
DPU	data processing unit	FM	frequency modulation
DRID	direct readout image dissector (camera system)	FMDM	flex multiplexer/demultiplexer
DRIR	direct readout infrared radiometer	FMRT	final meteorological radiation tape
DRTE	Defence Research Telecommunications Establishment (now CRC)	FOC	faint object camera
DSAP	Defense System Applications Program (DOD)	FOF2	frequency of F2
DSCS	Defense Satellite Communications System (DOD)	FOS	faint object spectrograph
DSIR	Department of Science and Industrial Research (England)	FOUND	foundation
DSN	Deep Space Network	FOV	field of view
DV	digital video	FPEG	fast pulse electron gun
DYN	dynamic	FPI	Fabry-Perot interferometer
		FPR	flat plate radiometer
		FR	French Research (satellite, France)
		FRC	Flight Research Center (NASA)
		FSC	FLEETSATCOM (satellite, USN-USAF)
		FSK	frequency shift key
		FWHM	full width at half maximum
		FWS	filter wedge spectrometer
E	energy		
EASEP	Early Apollo Scientific Experiment Package	GAC	global area coverage
ECG	electrocardiograph	GARP	Global Atmospheric Research Program
ECS	Experimental Communications Satellite (NASA)	GCA	Geophysics Corporation of America
EDS	Environmental Data Service (NOAA)	GE	General Electric (Company)
EEG	electroencephalogram	.GE.	greater than or equal to
EGO	Eccentric (Orbiting) Geophysical Observatory (satellite, NASA)	GEMS	Geostationary European Meteorological Satellite (ESA)
EGRS	Engineers Satellite (DOD)	GEOPHYS	geophysical
EICS	energetic ion composition spectrometer	GEOS	Geodetic Earth-Orbiting Satellite (NASA); Geostationary Earth-Orbiting Satellite (ESA)
EIRP	effective isotropic radiative power		
EL	electric (data camera carried on Apollo)	GES FUR	Gesellschaft für Weltraumforschung (Center for Space Research, Fed Rep of Germany)
ELDO	European Launch Development Organization (ESA)	WELTRAUM-FORSCH	
ELEC	electric	G.E.T.	ground elapsed time
ELECTR	electronics	GEX	gas exchange
ELF	extremely low frequency	GGSE	gravity gradient stabilization experiment
ELMS	Earth Limb Measurement Satellite (NASA-USAF)	GHZ	gigahertz
EME	environmental measurement experiment	GISS	Goddard Institute for Space Studies (NASA)
EMG	electromyogram	GM	Geiger-Mueller; gram
EMR	Electromechanical Research (Company, England)	GMS	Geostationary Meteorological Satellite (Japan)
ENVIRON	environment; environmental	GMT	Greenwich mean time
EOF	end of file	GOES	Geosynchronous Operational Environmental Satellite (NASA-NOAA; also called SMS)
EOG	electro-oculogram	GP	Gravitational Redshift Space Probe (NASA)
EOGO	Eccentric Orbiting Geophysical Observatory (satellite, NASA)	GPS	global positioning system
EOS	Earth Observation Satellite (NASA)	GRAVR	Gravitational Redshift Space Probe (NASA)
EPE	Energetic Particle Explorer (satellite, NASA)	GRE	ground reconstruction equipment; ground reconstruction electronics
E/Q	energy per unit charge	GREB	Galactic Radiation Experiment Background (satellite, USN)
ERB	Earth radiation budget (experiment)	GRI	Groupe de Recherche Ionosphérique (France)
ERBI	earth radiation budget instrument	GROC	Netherlands Committee for Geophysics and Space Research
ERBS	earth radiation budget satellite	GRS	German Research Satellite (NASA-Fed Rep of Germany)
ERBSS	earth radiation budget satellite system	GSD	Grid Sphere Drag (satellite, DOD)
ERDC	Earth Resources Data Center	GSE	geocentric solar ecliptic (coordinate system); ground support equipment
ERGS	Earth Geodetic Satellite (USAF)	GSFC	Goddard Space Flight Center (NASA)
ERL	Environmental Research Laboratory (NOAA)	GSM	geocentric solar magnetospheric (coordinate system)
EROS	Earth Resources Observation System	.GT.	greater than
ERS	Environmental Research Satellite (USAF)	GUGMS	Glavnoye Upravleniye Gidrometeorologicheskoi Sluzhby (Main Administration of the Hydrometeorological Service, USSR)
ERT	extended range telescope		
ERTS	Earth Resources Technology Satellite (NASA)	GV	gigavolt
ESA	European Space Agency; electrostatic analyzer	GVHRR	geosynchronous very high resolution radiometer
ESM	equipment support module		
ESMR	electrically scanning microwave radiometer		
ESOC	European Space Operations Centre (ESA)		
ESRO	European Space Research Organization (now ESA)		
ESSA	Environmental Science Services Administration (now NOAA)		
ESTABL	establishment		
ESTEC	European Space Technology Center (ESA)		

H	hour; hydrogen	ISPM	International Solar Polar Mission
HAC	half-angle collimator	ISRO	Indian Space Research Organization
HAO	High Altitude Observatory	ISS	Ionospheric Sounding Satellite (Japan)
HAPI	high-altitude plasma instrument	ITCZ	intertropical convergence zone
HCMM	Heat Capacity Map Mission (satellite, (NASA))	ITE	intersite transportation equipment
HCMR	Heat Capacity Mapping Radiometer	ITOS	Improved TIROS Operational Satellite (NOAA)
HCO	Harvard College Observatory	ITPR	infrared temperature profile radiometer
HDRSS	high data rate storage system	ITR	incremental tape recorder
HE	helium	ITSA	Institute for Telecommunication of Sciences and Aeronomy (formerly a subdivision of ESSA; now NOAA-ERL)
HEAO	High-Energy Astrophysical Observatory (NASA)	IU	instrument unit
HEOS	High-Eccentricity Earth-Orbiting Satellite (ESA)	IUE	International Ultraviolet Explorer (satellite, NASA-UK-ESA)
HEP	high-energy protons	IUS	intermediate upper stage
HEPAT	high-energy proton alpha telescope	IUNDS	International URSIGRAM and World Days Service
HET	health, education, telecommunications; high-energy telescope	IZMIRAN	Institute of Terrestrial Magnetism and Aeronomy of the Academy of Sciences (USSR)
HETS	high-energy telescope system		
HEW	health, education, and welfare		
HF	high frequency	JHU	Johns Hopkins University
HFE	heat-flow experiment; heat-flow electronics	JPL	Jet Propulsion Laboratory (NASA)
HOLE	high ionospheric depletion region	JSC	Johnson Space Center (NASA)
HR	high resolution		
HRIR	high-resolution infrared radiometer		
HRIRS	high-resolution infrared radiometer sounder	KBS	kilobits per second
HRPT	high-resolution picture transmission	KEV	kiloelectron volt
HRS	high-resolution spectrograph	KG	kilogram
HRTS	high-resolution telescope and spectrograph	KHZ	kilohertz
H.S.	high school	KM	kilometer
HSP	high-speed photometer	KP	magnetic activity index Kp
HYDROMET	hydrometeorological	KPNO	Kitt Peak National Observatory
HZ	hertz (cycles per second)	KSC	Kennedy Space Center (NASA)
HZE	high-energy particle		
IAP	Institute of Atmospheric Physics (USSR)	LA	Los Angeles
IBM	International Business Machines (Corp)	LAB	laboratory
ICBM	intercontinental ballistic missile	LAC	local area coverage
ICSU	International Council of Scientific Unions	LACATE	lower atmosphere composition and temperature
ID	identification	LAGEOS	Laser Geodetic Earth-Orbiting Satellite (NASA)
IDC	image dissector camera	LANG	Langmuir probe instrument
IDCS	image dissector camera system	LAPI	low-altitude plasma instrument
IDCSP	Initial (or Interim) Defense Communication Satellite Program (or Project) (DOD)	LARC	Langley Research Center (NASA)
IDM	ion drift meter	LAS	Large Astronomical Satellite (ESA)
IDSCS	Initial Defense Satellite Communication System (DOD)	LASL	Los Alamos Scientific Laboratory
IDT	instrument definition team	LCS	Lincoln Calibration Sphere
IE	Ionospheric Explorer (satellite, NASA-NBS)	LDEF	long-duration expos. fac.
IFGV	instrument field of view	.LE.	less than or equal to
IGRF	International Geomagnetic Reference Field	LED	light-emitting diode
IGY	International Geophysical Year	LEE	low-energy electron
IME	International Magnetospheric Explorer (satellite, NASA-ESA)	LEM	lunar excursion module
IMP	Interplanetary Monitoring Platform (satellite, NASA)	LEMS	low-energy magnetospheric measurement system
IMS	International Magnetospheric Study	LEPAT	low-energy proton alpha telescope
INDASAT	Indian Scientific Satellite (ISRO-USSR)	LEPEDEA	low-energy proton and electron differential energy analyzer
INOP	inoperable	LERC	Lewis Research Center (NASA)
INSAT	Indian National Satellite (ISRO-USSR)	LES	Lincoln Experimental Satellite (DOD)
INSB	indium/antimony	LET	low-energy telescope
INST	institute	LETS	low-energy telescope system
INTA	Instituto Nacional de Tecnica Aeroespacial (Spain); the National Institute of Aerospace Science	LF	light fine; low frequency
INTASAT	satellite (INTA, Spain)	LI	lithium
INTELSAT	International Telecommunications Satellite (NASA-COMSAT)	LIF	lithium fluoride
ION COMP	Ionospheric Composition (satellite--see DIAPO)	LL	Lincoln Laboratory (MIT)
IPA	Institute for Physics of the Atmosphere (SAS)	LM	lunar module
IPP	imaging photopolarimeter	LMD	Laboratory of Meteorological Dynamics
IPS	instrument pointing system	LOFTI	Low-Frequency Trans-Ionospheric (satellite, USN-NRL)
IQSY	International Quiet Sun Year	LOGACS	Low-G Accelerometer Calibration System (USAF)
IR	infrared	LP	Langmuir probe
IRAS	Infrared Astronomy Satellite	LPSP	Laboratoire de Physique Stellaire et Planetaire (CNRS)
IRBM	intermediate range ballistic missile	LR	labeled release; low resolution
IRIG	Inter-Range Instrumentation Group	LRIR	limb radiance inversion radiometer; low-resolution infrared radiometer
IRIS	infrared-interferometer spectrometer; International Radiation Investigation Satellite (NASA-ESA)	LRL	Lunar Receiving Laboratory (JSC)
IRLS	interrogation, recording, and location system	LRV	lunar roving vehicle
IRM	Ion Release Module (satellite, NASA)	LS	light smoothed
IRR	infrared radiometry	LST	Large Space Telescope (satellite, NASA)
IRTM	infrared thermal mapping	.LT.	less than
IRTRN	infrared transmission	LTV	Ling-Temco-Vought (Company)
ISAS	Institute of Space & Aeronautical Science (Japan)	M	meter, milli- (prefix)
ISEE	International Sun-Earth Explorer (satellite, NASA-ESA)	MA	Mercury Atlas
ISIS	International Satellite for Ionospheric Studies (NASA-Canada)	MAPS	measurement of air pollution from satellite
		MARENTS	Modified Advanced Research Environmental Test Satellite (USAF)
		MAS	Ministry of Aviation Supply (UK)
		MASC	magnetic attitude spin coil
		MASS	Massachusetts
		MATER	material
		MAWD	Mars atmosphere water detection
		MB	millibar

MC	megacycle	OAQ	Orbiting Astronomical Observatory (satellite, NASA)
MCC	Mission Control Center	OAPS	orbit adjust propulsion system
ME	Maine	OAR	Office of Aerospace Research (USAF-AFSC)
MED	medicine; medical	OART	Office of Advanced Research and Technology (NASA)
MESA	miniature electrostatic accelerometer	OAST	Office of Aeronautics and Space Technology (NASA)
METEC	Meteoroid Technology (satellite, NASA)	OBS	observatory
METEOSAT	Meteorological Satellite (ESA)	O+C	operations and checkout
MEV	million electron volts	OCC	OPLE Command Center
MG	milligram	OFO	Orbiting Frog Otolith (NASA experimental spacecraft)
MHZ	megahertz	OFT	orbital flight test
MIDAS	Missile Defense Alarm System (USAF)	OGO	Orbiting Geophysical Observatory (satellite, NASA)
MIN	minute	OGPC	orbiter general purpose computer
MIT	Massachusetts Institute of Technology	OI	other investigator
MJS	Mariner Jupiter/Saturn (spacecraft, NASA)	OIB	orbiter interface box
MM	millimeter	OLS	operational linescan system
MMS	multimission modular spacecraft	OMNI	low-resolution omnidirectional radiometer (on Explorer 7)
MMW	millimeter wave	OMSF	Office of Manned Space Flight (NASA)
MOL	Manned Orbiting Laboratory (satellite, DOD)	ONERA	Office National D'Etudes et de Recherches Aérospatiales
M-P	minus-plus	ONR	Office of Naval Research
MPI	Max-Planck-Institut (Fed Rep of Germany)	OOI	orbiter operational instrumentation
MR	medium resolution	OPEP	orbital-plane experiment package
MRIR	medium-resolution infrared radiometer	OPF	Orbiter Processing Facility
MS	microsecond; millisecond	OPLE	Omega position and location experiment
MSC	Manned Spacecraft Center (now Johnson Space Center)	OP OFF	operational off
MSFC	Marshall Space Flight Center (NASA)	ORBIS	Orbiting Radio Beacon Ionospheric Satellite (NASA)
MSN	mission	ORS	Octahedral Research Satellite (NASA); Orbiting Research Satellite (DOD)
MSS	Magnetic Storm Satellite (NASA-AFCRL); multispectral scanner	OSCAR	Orbiting Satellite Carrying Amateur Radio
MSSCC	multicolor spin-scan cloudcover camera	OSO	Orbiting Solar Observatory (satellite, NASA)
MTS	Meteoroid Technology Satellite (NASA)	OSS	Office of Space Science (NASA)
MUSE	monitor of ultraviolet solar energy	OSSA	Office of Space Science and Applications (NASA; now two separate offices)
MW	milliwatt	OSTA	Office of Space and Terrestrial Applications
NA	not applicable; Nora Alice (satellite, DOD)	OT	Operational TIROS (satellite, NASA)
NACE	neutral atmosphere composition experiment	OTDA	Office of Tracking and Data Acquisition (NASA)
NACS	neutral atmosphere composition spectrometer	OV	Orbiting Vehicle (satellite, USAF)
NADUC	Nimbus/ATS Data Utilization Center	OVT	organic vapor trap
NASA	National Aeronautics and Space Administration (Washington, D.C., Headquarters)	PAC	Packaged Attitude Control (satellite, NASA)
NASC	National Aeronautics and Space Council	PAET	Planetary Atmosphere Experiment Test
NASDA	National Space Development Agency (Japan)	PAEGOS	Passive Geodetic Earth-Orbiting Satellite (NASA)
NATE	neutral atmosphere temperature experiment	PAM	pulse amplitude modulation
NATL	national	PC	proportional counter
NATO	North Atlantic Treaty Organization	PCB	power control box
NBS	National Bureau of Standards	PCM	pulse coded modulation
NCAR	National Center for Atmospheric Research	PD	project director
NCC	National Climatic Center (NOAA)	PDP	plasma diagnostic package
NDRE	Norwegian Defence Research Establishment	PE	passive dosimeter packet
NE	Nebraska	PEA	Planetary Explorer
NEMS	Nimbus-E microwave spectrometer; Near-Earth Magnetospheric Satellite (ESA)	PEP	planar electrostatic analyzer
NESC	National Environmental Satellite Center (now NESS)	PEP	platform electronic package
NESS	National Environmental Satellite Service (NOAA)	PFM	pulse frequency modulation
NGM	direct measurement of interstellar gas using HE as tracer	PHA	pulse height analyzer
NGSP	National Geodetic Satellite Program	PHASR	Personnel Hazards Associated with Space Radiation (satellite, USAF)
NHC	National Hurricane Center	PHYS	physics
NIH	National Institutes of Health	PI	principal investigator
NIMS	near infrared mapping spectrometer	PIP	Payload Integration Plan
NMC	National Meteorological Center	PIXEL	picture element
NMRT	Nimbus meteorological radiation tape	PL	prelaunch
NNN	no national name	PLACE	position location and aircraft communication experiment
NNSS	Navy Navigational Satellite System	PM	pulse modulation; photomultiplier
NO.	number	PMEL	Pacific Marine Environmental Laboratory (NOAA)
NOAA	National Oceanic and Atmospheric Administration (formerly ESSA)	PMP	precision mounting platform
NOESS	National operational environmental satellite subsystem	PMR	pressure modulation radiometer; Pacific Missile Range
NOMSS	National Operational Meteorological Satellite System	PMT	photomultiplier tube
NORAD	North American Air Defense Command	P-N	positive-negative (junction)
NORW	Norwegian	POCC	OFT Payloads Operations Control Center
NOS	National Ocean Survey (NOAA)	POD	proton omnidirectional detector
NOTS	Naval Ordnance Test Station	POGO	Polar Orbiting Geophysical Observatory (satellite, NASA)
NRC	National Research Council	PPR	photopolarimeter radiometer
NRL	Naval Research Laboratory	PPS	pulses per second
NSA	National Security Agency	PR	pyrolytic release
NSF	National Science Foundation	PROT	protection
NSSDC	National Space Science Data Center	PS	pressure sensor
NT	nanotesla		
NUCL	nuclear		
NWL	Naval Weapons Laboratory		
NWP	natural plasma waves		
NWRC	National Weather Records Center (presently NCC)		
OA	Office of Applications (NASA)		

PSE	passive seismograph experiment	SIM	scientific instrument module
PTL	Photographic Technology Laboratory (JSC)	SIRE	satellite infrared experiment
PWI	plasma wave instrument	SIRS	satellite infrared spectrometer; System for Information Retrieval and Storage (NSSDC)
		SM	San Marco (satellite, NASA-Italy)
Q	charge	SMC	scanning modulation collimator
QOMAC	quarter-orbit magnetic attitude control (system)	SME	Solar Mesosphere Explorer (satellite, NASA)
		SMN	solar maximum mission
		SMMR	scanning multispectral microwave radiometer
		SMS	Synchronous Meteorological Satellite (NASA)
RA	Ranger (spacecraft, NASA)	SNAP	systems for nuclear auxiliary power
RAD	radium; radiation	SOEP	solar-oriented experiment package
RADCAT	Radar Calibration Target (satellite, ARPA)	SOLRAD	Solar Radiation (satellite, NASA-DOD)
RADOSE	Radiation Dosimeter (satellite, DOD)	SPADES	Solar Perturbation and Atmospheric Density Measurement Satellite (DOD)
RAE	Radio Astronomy Explorer (satellite, NASA)	SPHINX	Space Plasma High Voltage Interactive Experiment (satellite, NASA)
RAN	random access memory (system)	SPIDPO	Shuttle Payload Integration and Development Program Office
RANICON	resistor anode image converter	SPM	solar proton monitor
RBV	return beam vidicon (camera)	SPW	stimulated plasma waves
RC	resistance capacitor	SQ	square
RCA	Radio Corporation of America	SR	Solar Radiation (satellite, NASA); scanning radiometer; sounding rocket; steradian
RCE	reaction control equipment	SRATS	Solar Radiation and Thermospheric Structure (satellite, Japan)
R+D	research and development	SRC	Space Research Council; Science Research Council
REP	republic	SRI	Stanford Research Institute
RES	research	SRPA	spherical retarding potential analyzer
REXS	Radio Exploration Satellite (Japan)	SRT	supporting research and technology
RF	radio frequency	SSC	Satellite Situation Center
RFI	radio frequency interference	SSCC	spin-scan cloudcover camera
RFU	radioscope heater units	SSD	Space Science Division (JPL)
RIMS	retarding ion mass spectrometer	SSH	spherical sensor H
RM	Radiation Meteoroid (satellite, NASA); Radiometric Measurement (satellite, DOD)	SSM/T	special sensor microwave/temperature sounder
RMS	root mean square; Radiation Meteoroid Satellite (NASA); Radiometric Measurement Satellite (DOD); remote manipulator system	SSPP	Shuttle Spacelab Payloads Project
RPA	retarding potential analyzer	SSS	Small Scientific Satellite (NASA)
RPN	revolutions per minute	SST	satellite-to-satellite tracking
RPQ	retarding potential quadrupole	SSUS	solid spinning upper stage
RPS	revolutions per second	ST	space telescope
RRL	Radio Research Laboratories (Japan)	STADAN	Spacecraft Tracking and Data Acquisition Network (now STDN)
RSRS	Radio and Space Research Station (England)	STARAD	Starfish Radiation (satellite, NASA)
RTD	Research Technology Division (USAF)	STD	standard
RTG	radioisotope thermoelectric generator	STDN	Spaceflight Tracking and Data Network (NASA)
RTTS	real-time transmission system	STER	steradian
		STL	Space Technology Laboratories (now TRW Systems Group)
S	second	STN	station
SAA	South Atlantic Anomaly	STP	Solar Terrestrial Probe (satellite, NASA); Solar Terrestrial Physics
SAI	spin-scan auroral imager	STRATOS	stratosphere
SAM	stratospheric aerosol measurement	STS	Space Transportation Systems
SAMOS	Satellite Mission Observation (satellite, USAF)	STUD	studies
SAMS	stratospheric and mesospheric sounder	SUI	State University of Iowa (now University of Iowa)
SAMSO	Space and Missile Systems Organization (USAF)	SURCAL	Surveillance Calibration (satellite, DOD)
SAO	Smithsonian Astrophysical Observatory	SUSIM	solar ultraviolet spectral irradiance monitor
SAPPSAC	spacecraft attitude precision pointing and slewing adaptive control	SVC	service
SAS	Small Astronomy Satellite (NASA); Soviet Academy of Sciences	SW	southwest
SATAR	Satellite for Aerospace Research (NASA)	SWE	solar wind experiment
SAATELL	satellite	SWRF	Sine Wave Response Filter (program)
SATS	Satellite Antenna Test System (NASA)	SXR	solar X-ray flare and cosmic-ray burst investigation
SBRC	Santa Barbara Research Center	SYNCOM	Synchronous Communication (satellite, NASA) system
SC	project scientist; spark chamber	SYST	
SCAMS	scanning microwave spectrometer	TAC	Technology Application Center
SCATHA	spacecraft charging at high altitudes	TACOMSAT	Tactical Communications Satellite (DOD)
SCEL	Signal Corps Engineering Laboratories	TATS	Test and Training Satellite (NASA)
SCH	school	TATSACOM	Tactical Satellite Communications (program, DOD)
SCI	science	TBD	to be determined
SCMR	surface composition mapping radiometer	TD	technical director
SCORE	Signal Communication by Orbiting Relay Equipment (satellite, DOD)	TD	Thor-Delta (satellite, ESA); launch vehicle (NASA-USAF)
SCR	selective clopper radiometer	TDF	Tracking Data Processor (program)
SD	San Diego	T+DR	tracking & data relay
SDPF	Sensor Data Processing Facility	TDRSS	tracking and data relay satellite system
SE	Solar Explorer (satellite, NASA)	TEC	telemetry and command; transearth coast
SEA	spherical electrostatic analyzer	TECH	technical; technology
SEASAT	Ocean Dynamic Satellite (NASA)	TED	total energy detector
SEC	secondary electron conduction (vidicon tube)	TEI	transearth injection
SECOR	Sequential Collation of Range (satellite, USAF)	TELESAT	satellite, Canada (also referred to as ANIK)
SEN	space environment monitor	TEMP	temporal; temperature
SERT	Spinning Satellite for Electric Rocket Test (NASA)	TET	telescope and electron telescope
SESP	Space Experiment Support Program	TETR	Test and Training (satellite, NASA)
SESPO	Space Environmental Support Project Office	TEV	tetraellectron volts
SFA	sweep frequency analyzer		
SHS	Soviet Hydrometeorological Service		
SIBS	Salk Institute for Biological Studies		
SIDS	Space Investigations Documentation System (NASA)		
SIG	selenide isotope generator		

THORAD-AGE	Thor Augmented Delta Agona (launch vehicle)	V	volt
TIMATION	Time Location System (USN)	VAG	visible airglow experiment
TIP	Tracking Impact Prediction (satellite, DOD)	VAR	variation
TIROS	Television and Infrared Observation Satellite (NASA)	VAS	VISSR atmospheric sounder
TL	team leader	VDC	volts DC
TLD	thermoluminescence detector	VEFI	vector electric field instrument
TLI	translunar injection	VHF	very high frequency
TM	team member; thematic mapper	VHRR	very high resolution radiometer
TOMS	total ozone mapping system	VIS	visual imaging spectrometer
TOPO	topographic	VISSR	visible infrared spin-scan radiometer
TOPS	Thermal Noise Optical Optimization Communication System (NASA)	VLF	very low frequency
TOS	TIROS Operational Satellite (or System) (NASA)	VTPR	vertical temperature profile radiometer
TOVS	TIROS operational vortical sounder	W	watt
TPS	thick plastic stack	WA	Washington
TRAAC	Transit Research and Attitude Control (satellite, USN)	WATS	wind and temperature spectrometer
TRANET	Doppler Tracking Network (USN)	WBM	wide-band module
TRANSP	transportation	WBVTR	wideband video tape recorder
TRS	Tetrahedral Research Satellite (USAF)	WDC	World Data Center
TRUST	television relay using small terminals	WDC-A-RS	World Data Center A for Rockets and Satellites
TRW	Thompson, Ramo, Wooldridge, Inc	WEPAX	weather facsimile
TS	thermal smoothed	WFC	Wallops Flight Center (NASA); wave form channel
TT	triggering telescope	WGSPR	Working Group for Space Physics Research
TTS	Test and Training Satellite (NASA) (also called TATS, TETR)	WMO	World Meteorological Organization
TWERLE	tropical wind energy conversion and reference level experiment	WPM	words per minute
		WRESAT	Weapons Research Establishment Satellite (Australian)
U	university; atomic mass unit	WS	Wallops Station (NASA; now Wallops Flight Center)
UCLA	University of California at Los Angeles	WSMR	White Sands Missile Range
UIHF	ultrahigh frequency	WTR	Western Test Range (also referred to as Vandenberg AFB)
UK	United Kingdom	WWW	World Weather Watch
UKSRC	United Kingdom Space Research Council		
ULEWAT	ultralow-energy wide-angle telescope		
ULHZEQ	ultralow-energy Z, E, Q	XRFS	X-ray fluorescence spectrometer
US	United States		
USA	United States Army; United States of America		
USAF	United States Air Force	YR	year
USGS	United States Geological Survey		
USN	United States Navy		
USSR	Union of Soviet Socialist Republics	Z	atomic number
UT	universal time	ZLE	zodiacal light/background starlight investigation
UV	ultraviolet		
UVNO	ultraviolet nitric-oxide experiment		
UVS	ultraviolet spectrometer		